UNIVERSITY OF MADRAS

THE

CALENDAR FOR 1948-49

VOLUME III

Regulations,
Syllabuses, Text-Books, etc., for Professional
and Diploma Examinations.

Printed at Ananda Press and Published by The University of Madras.
1948

UNIVERSITY OF MADRAS

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VOLUME III

REGULATIONS,
SYLLABUSES, TEXT-BOOKS, FORMS OF ATTENDANCE
CERTIFICATES, TIME-TABLES FOR EXAMINATIONS,
EXAMINATION FEES, DATES OF EXAMINATIONS, ETC.

PUBLISHED BY
THE UNIVERSITY OF MADRAS

1948

[Price : Rs. 12/-

PRINTED AT
ANANDA PRESS, MADRAS.

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THE CALENDAR FOR 1948.

JULY

1	Th	*Half-yearly closing of Bank Accounts* (Holiday). **Agra University incorporated, 1927.**
2	F	Last day for submission of thesis for the Examination for the Diploma in Economics.
3	S	
4	**Sun**	
5	M	Last day for receiving attendance certificates for B.S.Sc. Part II and Diploma in Tuberculosis Examinations. Last day for receipt of applications with Treasury receipts in the Registrar's Office for Intermediate, B.A., B.A. (Hons.) Preliminary, B.Sc., B.Sc. (Hons.) Part I, B.Sc. (Hons.) Part II (Subsidiary), B.T., B. Com., B.O.L. (Pass) and B.O.L. (Hons.) Part I Examinations.
6	Tu	
7	W	
8	Th	
9	F	
10	S	Last day for receipt of applications for Research Studentships and Fellowships. Examinations for the Diploma in Economics, Politics and Public Administration and Statistics.
11	**Sun**	
12	M	
13	Tu	
14	W	
15	Th	M.L., B.S.Sc. Part II and Diploma in Tuberculosis Examinations. Last day for receipt of applications with Treasury receipts in the Registrar's Office for F.L., B.L., Intermediate (Nursing), B.Sc. (Nursing) and for all the Diplomas in Medicine and Surgery Examinations (except Diploma in Tuberculosis); and for the **Convocation**. Last day for receiving attendance certificates for all the Diplomas in Medicine and Surgery Examinations (except Diploma in Tuberculosis).
16	F	
17	S	
18	**Sun**	**University of Bombay incorporated, 1857.**
19	M	
20	Tu	
21	W	
22	Th	**University of Mysore incorporated, 1916.**
23	F	
24	S	*Penultimate Saturday* (Holiday).
25	**Sun**	
26	M	Publication of results of B.V.Sc. (N.R.) Final Examn.
27	Tu	
28	W	
29	Th	
30	F	
31	S	Last day for receipt of applications with Treasury receipts for exemption from the production of attendance certificates for Entrance Tests (for O.T. and Inter. Gr. D.) Examinations from private candidates and for O.T., Inter. Gr. D. & B.O.L. (Pass & Honours) Examinations from *bona fide* teachers.

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

AUGUST

1	**Sun**	Last day for receipt of reports from Colleges on the subjects and courses in which classes had not been opened for want of students.
2	M	**The Utkal University incorporated, 1943.**
3	Tu	
4	W	
5	Th	Last day for the submission of Return of Staff as on 1st August.
6	F	
7	S	*Ramzan* (Holiday).
8	**Sun**	
9	M	Publication of results of B.S.Sc. (Part II) and Diploma in Tuberculosis Examinations.
10	Tu	
11	W	
12	Th	
13	F	
14	S	
15	**Sun**	*Independence Day.* *Assumption Day.*
16	M	Last day for receiving attendance certificates for Intermediate, B.A., B.A. (Hons.) Preliminary, B.Sc., B.Sc. (Hons.) Part I and Part II Subsidiary, B.T., B. Com., B. O. L. (Pass) and B. O. L. (Honours) Part I Examinations. Publication of results of the Examinations for Diplomas in Economics, Politics and Public Administration and Statistics.
17	Tu	
18	W	
19	Th	*Avani Avittam* (Holiday).
20	F	
21	S	*Penultimate Saturday* (Holiday).
22	**Sun**	
23	M	
24	Tu	
25	W	
26	Th	
27	F	*Janmastami* (Holiday).
28	S	*Sri Jayanti* (Holiday).
29	**Sun**	
30	M	
31	Tu	Last day for receipt of applications for registration for M.Sc., M.Litt. and Ph.D., Degrees and for receipt of applications and theses for M.Sc., M.Litt., Ph.D., D.Litt., D.Sc., LL.D., and M.O.L. Degrees.

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

SEPTEMBER

1	W	Intermediate, B.A., B.A. (Hons.) Preliminary, B.Sc., B.Sc. (Hons.) Part I, B.O.L. (Pass) Part I., B.O.L. (Hons.) Part I, B.Com. and B.T. Examinations. Last day for receipt of applications with Treasury receipts in the Registrar's Office for the B.V.Sc. (N.R.) and (O.R.) Prely. and Inter. Examinations. Last day for receiving applications for pass certificates of Inter. Examination of March 1948.
2	Th	
3	F	
4	S	Inter. Group D, Part III and B.O.L. Part II (Revised) Examinations.
5	**Sun**	**University of Madras incorporated, 1857.**
6	M	*Vinayaka Chathurthi* (Holiday).
7	Tu	Publication of results of M.L. Examination.
8	W	**The Indian Universities' Act of 1904 came into force in the University of Madras, 1904.**
9	Th	
10	F	Last day for receiving attendance certificates for F.L. and B.L. Examinations.
11	S	
12	**Sun**	
13	M	
14	Tu	
15	W	*Onam* (Holiday). Last day for receipt of applications with Treasury receipts in the Registrar's Office for B.V.Sc (O.R.) Final Examination. Last day for receiving attendance certificates for the B.V.Sc. (N.R.) and (O.R.) Prely. and Inter. Examinations.
16	Th	
17	F	
18	S	*Penultimate Saturday* (Holiday).
19	**Sun**	
20	M	
21	Tu	
22	W	
23	Th	
24	F	
25	S	F.L. and B.L. Examinations.
26	**Sun**	
27	M	
28	Tu	
29	W	
30	Th	Last day for receipt of applications with Treasury receipts for exemption from *bona fide* teachers to appear for Matric., Inter., B.A. and M.A. Degree Examinations and from other private candidates for Matric. Examination, March, 1949.

Note:—The date of commencement of all examinations and time-tables in detail as finally fixed will be published in the *Gazette* in the preceding August.

OCTOBER

1	F	**University of Patna incorporated, 1917.** Last day for receiving attendance certificates for B.V.Sc. (O.R.) Final, Intermediate (Nursing) and B.Sc. (Nursing) Examinations. B V.Sc. (N.R.) & (O.R.) Prely. and Inter. Examinations. Last day for receipt of Hostel Returns and Reports of Medical inspections from Colleges.
2	S	*Mahalaya Amavasai* (Holiday).
3	**Sun**	
4	M	
5	Tu	Publication of results of Inter., B.A., B.A. (Hons.) Prely., B.Sc., B.Sc. (Hons.) Part I and Part II (Subsidiary), B.O.L. (Pass.), B.O.L. (Honours) Part 1, B.Com. and B.T. Examinations.
6	W	
7	Th	**Osmania University incorporated, 1918.**
8	F	Last day for receipt of applications with Treasury receipts in the Registrar's Office for Pre-Registration, First, Second and Final M.B. & B.S. and B.Sc. (Pharmacy) Prely. and Final Examinations.
9	S	
10	**Sun**	*Ayudha Puja.*
11	M	*Ayudha Puja* (Holiday).
12	Tu	*Ayudha Puja* (Holiday).
13	W	
14	Th	*Bakrid* (Holiday).
15	F	**University of the Punjab incorporated, 1882.** B.V.Sc. (O.R.) Final, Intermediate (Nursing), B.Sc. (Nursing) and all the Diplomas in Medicine & Surgery Examinations (except Diploma in Tuberculosis). Last day for receipt of applications with Treasury receipts in the Registrar's Office for B.S.Sc. Part II Examination.
16	S	
17	**Sun**	
18	M	
19	Tu	
20	W	
21	Th	
22	F	
23	S	*Penultimate Saturday* (Holiday).
24	**Sun**	
25	M	
26	Tu	
27	W	
28	Th	
29	F	**The Madras University Amendment Act of 1929 came into force.**
30	S	*Deepavali* (Holiday).
31	**Sun**	Last day for receipt of applications from institutions for recognition, affiliation or approval in any University course or courses from the following academic year.

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

NOVEMBER

1	M	**University of Travancore incorporated, 1937.** Last day for receipt of applications for scrutiny for purposes of appearing for the Matriculation Examination. Publication of results of B.V.Sc. (N.R.) and (O.R.) Prely. and Inter. Examinations.
2	Tu	
3	W	
4	Th	
5	F	
6	S	
7	**Sun**	
8	M	Publication of results of F.L., B.L. and B.V.Sc. (O.R.) Final Examinations.
9	Tu	
10	W	Last day for receiving attendance certificates for B.S.Sc. Part II Examination.
11	Th	
12	F	*Muharram* (Holiday).
13	S	
14	**Sun**	
15	M	Last day for receipt of applications with Treasury receipts in the Registrar's Office for Entrance Tests, O.T., B.O.L. (Pass and Honours), Sangita Siromani, B.V.Sc. (N.R.) Final, Diploma in Tuberculosis and Diploma in Journalism Examinations. Publication of results of Examinations for all the Diplomas in Medicine and Surgery (except Diploma in Tuberculosis), Intermediate (Nursing) and B.Sc. (Nursing).
16	Tu	**University of Allahabad incorporated, 1887.**
17	W	
18	Th	
19	F	
20	S	*Penultimate Saturday* (Holiday). Last day for receiving attendance certificates for First, Second and Final M.B. & B.S. Examinations. B.S.Sc. Part II Examination.
21	**Sun**	
22	M	
23	Tu	
24	W	
25	Th	
26	F	
27	S	
28	**Sun**	
29	M	
30	Tu	

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

DECEMBER

1	W	**Publication in the Gazette of India in 1904, of the Chancellor's Declaration that the Body Corporate of the University of Madras had been constituted in accordance with the provisions of the Indian Universities Act, 1904.** Last day for receipt of applications for the Diploma Courses in Tuberculosis and Journalism. **University of Rangoon and Muslim University, Aligarh incorporated, 1920.** Last day for receipt of applications with Treasury receipts in the Registrar's Office for B.S.Sc. (Part I) Examination. Last day for receiving attendance certificates for Pre-Registration, B.Sc. (Pharmacy) Prely. and Final and B.V.Sc. (N.R.) Final Examinations. First, Second and Final M.B. & B.S. Examinations.
2	Th	
3	F	
4	S	
5	**Sun**	
6	M	
7	Tu	
8	W	
9	Th	
10	F	Pre-Registration and B.Sc. (Pharmacy) Prely. and Final Examinations.
11	S	**University of Lucknow incorporated, 1920.**
12	**Sun**	
13	M	
14	Tu	
15	W	Last day for receipt of applications with Treasury receipts in the Registrar's Office for Matriculation, B.A. (Hons.) Final, and B.Sc. (Hons.) Part II (Main subjects) and M.A. Examinations. B.V.Sc. (N.R.) Final Examination.
16	Th	
17	F	
18	S	*Penultimate Saturday* (Holiday).
19	**Sun**	
20	M	Publication of results of First, Second and Final M.B. & B.S. & B.S.Sc. Part II Examinations.
21	Tu	
22	W	
23	Th	
24	F	
25	S	*Christmas Day* (Holiday).
26	**Sun**	
27	M	
28	Tu	
29	W	
30	Th	
31	F	(Holiday).

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

THE CALENDAR FOR 1949[a]

JANUARY

1	S	**New Year's Day.** (Holiday).
		Annamalai University, incorporated, 1929.
2	**Sun**	
3	M	
4	Tu	
5	W	Last day for receiving attendance certificates for B.S.Sc. (Part I) and Diploma in Tuberculosis and Diploma in Journalism Examinations.
		Publication of results of Pre-Registration and B.Sc. (Pharmacy) Prely. and Final Examinations.
6	Th	
7	F	
8	S	
9	**Sun**	
10	M	Last day for receipt of applications with Treasury receipts in the Registrar's Office for Inter., B.A., B.A. (Hons.) Preliminary, B.Sc., B.Sc. (Hons.) Part I and Part II (Subsidiary) and B.Com. Examns.
11	Tu	*Vaikunta Ekadesi* (Holiday).
12	W	*Meladi Nabi* (Holiday).
13	Th	*Bhogi Pongal* (Holiday).
14	F	*Pongal* (Holiday).
15	S	B.S.Sc. Part I, Diploma in Tuberculosis and Diploma in Journalism Examinations.
		Last day for receipt of applications with Treasury receipts in the Registrar's Office for F.E., B.E., B.Sc.Ag., B.Sc. (Tech.), B.T., M.Ed., F.L., B.L., M.L., Pre-Regn., First, Second & Final M.B. & B.S., M.D., M.S., B.Sc. (Pharm.) Prely. & Final, Intermediate (Nursing), B.Sc. (Nursing), all Diplomas in Medicine & Surgery (except Dip. in Tuberculosis), Dip. in Economics, Dip. in Indian Music, Dip. in Geography, Dip. in Librarianship, Dip. in Politics & Public Admn., & Certificate & Dip. in Anthropology Examinations & for Examinations for the Certificates & Diplomas in French & German; & for the **Convocation.**
		Last day for receiving attendance certificates for M.D., M.S., & for all the Diplomas in Medicine & Surgery Examinations (except Dip. in Tuberculosis).
16	**Sun**	**University of Calcutta incorporated, 1857.**
17	M	
18	Tu	
19	W	
20	Th	
21	F	
22	S	*Penultimate Saturday* (Holiday).
23	**Sun**	
24	M	Publication of results of B.V.Sc. (N.R.) Final Examn.
25	Tu	
26	W	**Andhra University incorporated, 1926.**
27	Th	
28	F	
29	S	
30	**Sun**	
31	M	Last day for receipt of applications for registration for M.Sc., M.Litt. and Ph.D. Degrees and for receipt of applications and theses for the M.Sc., M.Litt., Ph.D., D.Litt., D.Sc., LL.D. and M.O.L. Degrees.

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

(*a*) **Holidays noted for the year are subject to alteration consequent on the publication of Holidays by the Government.**

FEBRUARY

1	Tu	Last day for receiving applications for pass certificates of Intermediate Examination of September 1948.
2	W	
3	Th	
4	F	
5	S	
6	**Sun**	
7	M	Publication of results of B.S.Sc. Part I Examination.
8	Tu	
9	W	
10	Th	
11	F	
12	S	
13	**Sun**	
14	M	
15	Tu	Publication of results of Diploma in Tuberculosis and Diploma in Journalism Examinations.
16	W	
17	Th	
18	F	
19	S	*Penultimate Saturday* (Holiday).
20	**Sun**	
21	M	
22	Tu	
23	W	
24	Th	
25	F	*Mahasivarathri* (Holiday).
26	S	
27	**Sun**	
28	M	**Madras University Act VII of 1923 received the assent of the Governor of Madras.** Last day for receipt of applications with Treasury receipts from *bona fide* teachers for exemption to appear for the Inter. and B.A. Degree Examinations of September 1949.

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

MARCH

1	Tu	Last day for receipt of applications with Treasury receipts in the Registrar's Office for B.S.Sc. Part I, B.V.Sc.(N.R.) and (O.R.) Prely. and Inter. Examinations.
2	W	*Ash Wednesday* (Holiday).
3	Th	
4	F	
5	S	
6	**Sun**	
7	M	
8	Tu	
9	W	Last day for receiving attendance certificates for Matriculation, Intermediate, B.A., B.A. (Hons.) Preliminary and Final, M.A., B.Sc., B.Sc. (Hons.), B. Com., O.T., B.O.L. (Pass and Honours), F.E. and B.E. and Sangita Siromani Examinations.
10	Th	
11	F	
12	S	
13	**Sun**	
14	M	
15	Tu	Last day for receiving attendance certificates for B.V.Sc.(N.R.) and (O.R.) Prely. and Inter. Examns. Last day for receipt of applications with Treasury receipts in the Registrar's Office for the Examination for the Diploma in Statistics.
16	W	
17	Th	
18	F	
19	S	*Penultimate Saturday* (Holiday). Last day for receiving attendance certificates for B.T., M. Ed., B.Sc. Ag., B. Sc. (Tech.), and Diploma in Economics Examinations.
20	**Sun**	Last day for receiving attendance certificates for Pre-Registration, First, Second and Final M.B. & B.S., B.Sc. (Pharmacy) Prely. and Final Intermediate (Nursing) & B.Sc. (Nursing) Examinations.
21	M	Matriculation, Inter., B.A., B.A. (Hons.) Prely. and Final, M.A., B.Sc., B.Sc. (Hons.) (Part I and Part II Main), B. Com., F.E., B.E., B.O.L. Pass Part I, B.O.L. (Honours) Parts I & II and Sangita Siromani and Inter. Group D. Entrance Test Examinations. **The Indian Universities' Act, 1904, received the assent of the Governor-General.**
22	Tu	
23	W	**University of Dacca incorporated, 1920.**
24	Th	
25	F	
26	S	
27	**Sun**	
28	M	O.T. Prely. and B.O.L. Part II Examinations. Last day for receipt of applications with Treasury receipts in the Registrar's Office for the B.V.Sc. (O.R.) Final Examination.
29	Tu	**Madras University Act VII of 1923 received the assent of the Governor-General.**
30	W	*Telugu New Year's Day* (Holiday).
31	Th	Last day for submission of Field Work Records for the Examination for the Diploma in Geography.

Note—The dates of commencement of all examinations, and time-tables in detail as finally fixed will be published in the *Gazette* in the preceding February.

Practical Test for deferred candidates for B.T. will be held in the first week of March.

APRIL

1	F	**Benares Hindu University incorporated, 1916.** B.T., M.Ed., Pre-Registration, First, Second and Final M.B. & B.S., First and Second B.Sc. (Ag.), B.Sc. (Tech.) Part I, B.V.Sc. (N.R.) and (O.R.) Prely. and Inter., B.Sc. (Pharmacy) Prely. and Final, Intermediate (Nursing), B.Sc. (Nursing), M.D., M.S., and all Diplomas in Medicine & Surgery Examinations (except Diploma in Tuberculosis). Last day for receiving attendance certificates for F.L., B.L., Diploma in Indian Music, Diploma in Librarianship and Diploma in Geography Examinations.
2	S	
3	**Sun**	
4	M	
5	Tu	Last day for receiving attendance Certificates for B.S.Sc. Part I Examination.
6	W	
7	Th	*Sri Rama Navami.*
8	F	Last day for receiving attendance certificates for the B.V.Sc. (O.R.) Final Examination. B.Sc. (Ag.) Final Examination.
9	S	
10	**Sun**	
11	M	Examinations for the Diploma in Indian Music and Diploma in Geography. Last day for receiving attendance certificates for the Examinations for the Certificates and Diplomas in French and German and for Certificate and Diploma in Anthropology.
12	Tu	
13	W	*Tamil New Year's Day* (Holiday).
14	Th	
15	F	*Good Friday* (Holiday).
16	S	F.L., B.L., and B.S.Sc. Part I Examinations. Last day for receiving attendance certificates for Diploma in Politics and Public Administration and Diploma in Statistics Examinations.
17	**Sun**	*Easter* (Holiday).
18	M	Publication of results of Pre-Registration Examn. B.V.Sc. (O.R.) Final Examination.
19	Tu	
20	W	Examination for the Diploma in Librarianship. Publication of results of First and Second M.B. & B.S. Examinations.
21	Th	
22	F	
23	S	*Penultimate Saturday* (Holiday).
24	**Sun**	
25	M	Certificate and Diploma in French and Certificate in Anthropology Examinations.
26	Tu	Certificate and Diploma Examinations in German.
27	W	**Andhra University inaugurated, 1926.** Diploma Examination in Anthropology.
28	Th	
29	F	
30	S	

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

MAY

1	**Sun**	**University of Delhi incorporated, 1922.** **The Madras University Act, 1923, came into force.**
2	M	Publication of results of B.Sc. (Pharmacy) Prely. and Final, Final M.B. & B.S., Intermediate (Nursing), B.Sc. (Nursing), M.D., M.S., and all the Diplomas in Medicine and Surgery Examinations (except Diploma in Tuberculosis.) Publication of results of B.S.Sc. Part I, F.E. & B.E. Examinations.
3	Tu	
4	W	
5	Th	
6	F	
7	S	
8	**Sun**	
9	M	Publication of results of B.A. (Hons.) Final and M.A., & B.V.Sc. (N.R.) and (O.R.) Prely. & Inter Examinations.
10	Tu	
11	W	
12	Th	
13	F	
14	S	Last day for submission of Dissertation for the Examination for the Diploma in Geography.
15	**Sun**	
16	M	Last day for receipt of applications with Treasury receipts in the Registrar's Office for the B.V.Sc. (N.R.) Final Examination. Publication of results of Matric., Intermediate, B.Sc. (Hons.) Part II (Main), B.Sc. (Tech.), B.Sc. (Ag.) Examinations.
17	Tu	
18	W	
19	Th	
20	F	
21	S	*Penultimate Saturday* (Holiday). **Madras University—Appointment of the First Vice-Chancellor under the Act of 1923.**
22	**Sun**	
23	M	Publication of results of B.A., B.A. (Hons.) Preliminary, B.Sc., B.Sc. (Hons.) Part I and Part II (Subsidiary), B.T., M.Ed., B.Com., B.V.Sc. (O.R.) Final, Entrance Test, O.T., B.O.L. (Pass and Honours), Diploma in Indian Music, Diploma in Librarianship and Sangita Siromani Examinations.
24	Tu	
25	W	
26	Th	*Ascension Day.*
27	F	
28	S	
29	**Sun**	
30	M	
31	Tu	

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

JUNE

1	W	Last day for receipt of applications with Treasury receipts in the Registrar's Office for B.S.Sc. Part II and Diploma in Tuberculosis Examinations. Last day for receiving attendance certificates for the B.V.Sc. (N.R.) Final Examination.
2	Th	
3	F	
4	S	**University of Nagpur incorporated, 1923.**
5	**Sun**	
6	M	Publication of results of Certificate and Diploma Examinations in Anthropology.
7	Tu	
8	W	
9	Th	
10	F	
11	S	
12	**Sun**	
13	M	*Shab-e-Barath.* Publication of results of F.L., B.L. Examinations and for the Certificates and Diplomas in French and German.
14	Tu	
15	W	Last day for receipt of applications for admission to the Diploma Courses conducted by the University except Diploma Courses in Tuberculosis and Journalism. Publication of results of the Examination for the Diploma in Geography. B.V.Sc. (N.R.) Final Examination.
16	Th	
17	F	
18	S	*Penultimate Saturday* (Holiday).
19	**Sun**	
20	M	
21	Tu	
22	W	
23	Th	
24	F	
25	S	
26	**Sun**	
27	M	
28	Tu	
29	W	
30	Th	

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

JULY

1	F	*Half-yearly closing of Bank Accounts* (Holiday). Last day for submission of thesis for the Examination for the Diploma in Economics. **Agra University incorporated, 1927.**
2	S	
3	**Sun**	
4	M	
5	Tu	Last day for receiving attendance certificates for B.S.Sc. Part II and Diploma in Tuberculosis Examinations. Last day of receipt of applications with Treasury receipts in the Registrar's Office for Intermediate, B.A., B.A. (Hons.) Preliminary, B.Sc., B.Sc. (Hons.) Part I, B.Sc. (Hons.) Part II (Subsidiary), B.T., B.Com. and B.O.L. (Pass)and B.O.L. (Hons.) Part I Examinations.
6	W	
7	Th	
8	F	
9	S	
10	**Sun**	
11	M	Last day for receipt of applications for Research Studentships and Fellowships. Examinations for the Diploma in Economics, Politics and Public Administration and Statistics.
12	Tu	
13	W	
14	Th	
15	F	M.L., B.S.Sc. Part II and Diploma in Tuberculsis Examinations. Last day for receipt of applications with Treasury receipts in the Registrar's Office for F.L., B.L., Intermediate (Nursing), B.Sc. (Nursing) and for all the Diplomas in Medicine and Surgery Examinations (except Diploma in Tuberculosis); and for the **Convocation.** Last day for receiving attendance certificates for all the Diplomas in Medicine and Surgery Examinations (except Diploma in Tuberculosis).
16	S	
17	**Sun**	
18	M	**University of Bombay incorporated, 1857.**
19	Tu	
20	W	
21	Th	
22	F	**University of Mysore incorporated, 1916.**
23	S	*Penultimate Saturday* (Holiday).
24	**Sun**	
25	M	Publication of results of B.V.Sc. (N.R.) Final Examn.
26	Tu	
27	W	
28	Th	*Ramzan* (Holiday).
29	F	
30	S	
31	**Sun**	Last day for receipt of applications with Treasury receipts for exemption from the production of attendance certificates for Entrance Tests (for O.T. and Inter. Gr. D.) Examinations from private candidates and for O.T., Intermediate—Group D & B.O.L. (Pass & Honours) Examinations from *bona fide* teachers.

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

AUGUST

1	M	Last day for receipt of reports from Colleges on the subjects and courses in which classes had not been opened for want of students.
2	Tu	**The Utkal University incorporated, 1943.**
3	W	
4	Th	
5	F	Last day for the submission of Return of Staff as on 1st August.
6	S	
7	**Sun**	
8	M	*Avani Avittam* (Holiday).
9	Tu	Publication of results of B.S.Sc. (Part II) and Diploma in Tuberculosis Examintions.
10	W	
11	Th	
12	F	
13	S	
14	**Sun**	
15	M	*Independence Day.* *Assumption Day.*
16	Tu	Last day for receiving attendance certificates for Intermediate, B.A., B.A. (Hons.) Preliminary, B.Sc., B.Sc. (Hons.) Part I and Part II Subsidiary, B.T., B.Com., B. O. L. (Pass) and B. O. L. (Honours) Part I Examinations. Publication of results of the Examinations for Diplomas in Economics, Politics and Public Administration and Statistics.
17	W	
18	Th	
19	F	
20	S	*Penultimate Saturday* (Holiday).
21	**Sun**	
22	M	
23	Tu	
24	W	
25	Th	
26	F	
27	S	*Vinayaka Chathurthi* (Holiday).
28	**Sun**	
29	M	
30	Tu	
31	W	Last day for receipt of applications for registration for M.Sc., M.Litt. and Ph.D. Degrees and for receipt of applications and theses for M.Sc., M.Litt., Ph.D., D.Litt., D.Sc., LL.D. and M.O.L. Degrees.

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

SEPTEMBER

1	Th	Intermediate, B.A., B.A. (Hons.) Preliminary, B.Sc., B.Sc. (Hons.) Part I, B.O.L. (Pass) Part I B.O.L. (Hons.) Part I, B.Com. and B.T. Examinations. Last day for receipt of applications with Treasury receipts in the Registrar's Office for the B.V.Sc. (N.R.) and (O.R.) Prely. and Inter. Examinations. Last day for receiving applications for pass certificates of Inter. Examination of March 1949.
2	F	
3	S	
4	**Sun**	*Onam* (Holiday).
5	M	**University of Madras incorporated, 1857.** Inter. Group D, Part III and B.O.L. Part II (Revised) Examinations. Publication of results of M.L. Examination.
6	Tu	
7	W	
8	Th	**The Indian Universities' Act of 1904 came into force in the University of Madras, 1904.**
9	F	
10	S	Last day for receiving attendance certificates for F.L. and B.L. Examinations.
11	**Sun**	
12	M	
13	Tu	
14	W	
15	Th	*Sri Jayanthi* (Holiday).
16	F	Last day for receipt of applications with Treasury receipts in the Registrar's Office for B.V.Sc. (O.R.) Final Examination. Last day for receiving attendance certificates for the B.V.Sc. (N.R.) and (O.R.) Prely. and Inter. Examinations.
17	S	*Penultimate Saturday* (Holiday).
18	**Sun**	
19	M	
20	Tu	
21	W	
22	Th	*Mahalaya Amavasai* (Holiday).
23	F	
24	S	
25	**Sun**	
26	M	F.L. and B.L. Examinations.
27	Tu	
28	W	
29	Th	
30	F	*Ayudha Pujah* (Holiday). Last day for receipt of applications with Treasury receipts for exemption from *bona fide* teachers to appear for Matric., Inter., B.A. and M.A. Degree Examinations and from other private candidates for Matric. Examination, March, 1950.

Note:—The date of commencement of all examinations and time-tables in detail as finally fixed will be published in the *Gazette* in the preceding August.

OCTOBER

1	S	*Ayudha Puja* (Holiday). Last day for receiving attendance certificates for B.V.Sc. (O.R.) Final, Intermediate (Nursing), and B.Sc. (Nursing) Examinations. **University of Patna incorporated, 1917.**
2	**Sun**	
3	M	*Bakrid* (Holiday).
4	Tu	B.V.Sc. (N.R.) & (O.R.) Prely. and Inter. Examinations. Last day for receipt of Hostel Returns and Reports of Medical inspections from Colleges.
5	W	Publication of results of Inter., B.A., B.A. (Hons.) Prely., B.Sc., B.Sc. (Hons.) Part I and Part II Subsidiary, B.O.L. (Pass) Part I, B.O.L. (Honours) Part I, B.Com. and B.T. Examinations.
6	Th	
7	F	**Osmania University incorporated, 1918.**
8	S	Last day for receipt of applications with Treasury receipts in the Registrar's Office for Pre-Registration, First, Second and Final M.B. & B.S. and B.Sc. (Pharmacy) Prely. and Final Examinations.
9	**Sun**	
10	M	
11	Tu	
12	W	
13	Th	
14	F	**University of the Punjab incorporated, 1882.**
15	S	B.V.Sc. (O.R.) Final, Intermediate (Nursing), B.Sc. (Nursing) and all the Diplomas in Medicine & Surgery Examinations except Diploma in Tuberculosis. Last day for receipt of applications with Treasury receipts in the Registrar's Office for B.S.Sc. Part II Examination.
16	**Sun**	
17	M	
18	Tu	
19	W	
20	Th	
21	F	*Deepavali* (Holiday).
22	S	*Penultimate Saturday* (Holiday).
23	**Sun**	
24	M	
25	Tu	
26	W	
27	Th	
28	F	
29	S	**The Madras University Amendment Act of 1929 came into force.**
30	**Sun**	
31	M	Last day for receipt of applications from institutions for recognition, affiliation or approval in any University course or courses from the following academic year.

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

NOVEMBER

1	Tu	**University of Travancore incorporated, 1937.** Last day for receipt of applications for scrutiny for purposes of appearing for the Matriculation Examination.
2	W	*Muharram* (Holiday)
3	Th	
4	F	
5	S	
6	**Sun**	
7	M	Publication of results of B.V.Sc. (N.R.) and (O.R.) Prely. and Inter. Examinations.
8	Tu	
9	W	
10	Th	Last day for receiving attendance certificates for B.S.Sc. Part II Examination.
11	F	
12	S	
13	**Sun**	
14	M	Publication of results of F.L., B.L. and B.V.Sc. (O.R.) Final Examinations.
15	Tu	Last day for receipt of applications with Treasury receipts in the Registrar's Office for Entrance Tests, O.T., B.O.L. (Pass and Honours), Sangita Siromani, B.V.Sc. (N.R.) Final, Diploma in Tuberculosis and Diploma in Journalism Examinations. Publication of results of Examinations for all the Diplomas in Medicine and Surgery (except Diploma in Tuberculosis), Intermediate (Nursing) and B.Sc. (Nursing).
16	W	**University of Allahabad incorporated, 1887.**
17	Th	
18	F	
19	S	*Penultimate Saturday* (Holiday).
20	**Sun**	
21	M	Last day for receiving attendance certificates for First, Second and Final M. B. & B. S. Examinations. B.S.Sc. Part II Examination.
22	Tu	
23	W	
24	Th	
25	F	
26	S	
27	**Sun**	
28	M	
29	Tu	
30	W	

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

DECEMBER

1	Th	**Publication in the Gazette of India in 1904, of the Chancellor's Declaration that the Body Corporate of the University of Madras had been constituted in accordance with the provisions of the Indian Universities' Act, 1904.** Last date for receipt of applications for the Diploma Courses in Tuberculosis and Journalism. **University of Rangoon and Muslim University, Aligarh incorporated, 1920.** Last day of receipt of applications with Treasury receipts in the Registrar's Office for B.S.Sc. (Part I) Examination. Last day for receiving attendance certificates for Pre-Registration, B.Sc. (Pharmacy) Prely. and Final and B.V.Sc. (N.R.) Final Examinations. First, Second and Final M.B. & B.S. Examinations.
2	F	
3	S	
4	**Sun**	
5	M	
6	Tu	
7	W	
8	Th	
9	F	
10	S	Pre-Registration and B.Sc. (Pharmacy) Prely. and Final Examinations.
11	**Sun**	**University of Lucknow incorporated, 1920.**
12	M	
13	Tu	
14	W	
15	Th	Last day of receipt of applications with Treasury receipts in the Registrar's Office for Matriculation, B.A. (Hons.) Final and B. Sc. (Hons.) Part II (Main subjects) and M.A. Examinations. B.V.Sc. (N.R.) Final Examination.
16	F	
17	S	
18	**Sun**	
19	M	
20	Tu	Publication of results of First, Second and Final M.B. & B.S. & B.S.Sc. Part II Examinations.
21	W	
22	Th	
23	F	
24	S	*Penultimate Saturday* (Holiday).
25	**Sun**	*Christmas Day* (Holiday.)
26	M	
27	Tu	
28	W	
29	Th	
30	F	
31	S	*Vaikunta Ekadesi* (Holiday).

Late applications for Examinations with an additional fee of Re. 1 will be accepted within five days after the prescribed date.

INSTITUTIONS RECOGNISED BY OR AFFILIATED TO THE UNIVERSITY.

CONSTITUENT COLLEGES

FACULTIES OF ARTS AND SCIENCE

		Names of Colleges.	*Courses taught.*
1.	Madras,	Government Muslim College. 1	Intermediate, B. A., B. A. (Honours) & B.Sc.
2.	Do.	Loyola College. 2	Intermediate, B.A., B.Sc., B.Com., B.A. (Hons.), B.Sc. (Hons.) & B.Com. (Hons.).
3.	Do.	Pachaiyappa's College. 2	Intermediate, B.A., B.Sc., B. Com., B. A. (Hons.), B.Com. (Hons.) & B.O.L. (Hons.).
4.	Do.	Presidency College.* 1	B.A., B.Sc., B.A. (Honours) & B.Sc. (Honours.)
5.	Do.	Vivekananda College. 2	Intermediate, B.A., B.Sc., B.Com., B.A. (Hons.) & B.Sc. (Hons.).
6.	Do.	Queen Mary's College (Women). 1	Intermediate, B.A., B.Sc., B. Sc. (Hons.) & B. A. (Hons.).
7.	Do.	Women's Christian College (Women.) 2	Intermediate, B.A. & B.Sc.
8.	Do.	Ethiraj College for Women. 2	Intermediate & B.A.
9.	Do.	Stella Maris College. 2	Intermediate & B.A.

FACULTY OF LAW

	Madras,	Law College. 1	B.L.

FACULTY OF MEDICINE

1.	Madras,	Medical College. 1	Pre-Registration, M.B.B.S., M.D., M.S., B.S.Sc., B.Sc. (Pharmacy) & Diploma Courses.
2.	Do.	Stanley Medical College. 1	Pre-Registration, M.B.B.S., M. D., M. S. & Diploma Course.

FACULTY OF ENGINEERING

	Madras,	College of Engineering (Guindy). 1	B.E.

Note.—1. Institutions under Public Management.
2. Aided Institutions. 3. Other Institutions.

* Only Senior Intermediate classes conducted in 1948–49.

Names of Colleges.			*Courses taught.*
		FACULTY OF TEACHING	
1.	Madras,	Lady Willingdon Training College (Women). 1	B.T. & M.Ed.*
2.	Do.	Meston Training College. 2	Do.
3.	Do.	St. Christopher's Training College. (Women). 2	Do.
4.	Do.	Teachers' College, (Saidapet). 1	Do.
		FACULTY OF VETERINARY SCIENCE	
	Madras,	Madras Veterinary College. 1	B.V.Sc.
		FACULTY OF COMMERCE	
1.	Madras,	Loyola College. 2	B.Com. (Pass & Hons.).
2.	Do.	Pachaiyappa's College. 2	Do.
3	Do.	Vivekananda College. 2	B.Com.
		FACULTY OF ORIENTAL LEARNING	
1.	Madras,	Loyola College. 2	(*a*) Intermediate—Group D. & B.O.L.
2.	Do.	Pachaiyappa's College. 2	Intermediate & B. O. L. (Hons.).

(For Oriental Title Institutions *vide* p. 5)

AFFILIATED COLLEGES

FACULTIES OF ARTS AND SCIENCE

1.	Bellary, Veerasaiva College. 2	Intermediate
2.	Calicut, Malabar Christian College. 2	Do.
3	Do. Zamorin's College. 2	Do.
4.	Coimbatore, (Peelamedu) P.S.G. Arts College. 2	Do.
5.	Do. Nirmala College for Women. 2	Do.
6.	Cuddapah, Government College. 1	Do.
7.	Madura, Lady Doak College. 2	Do.
8.	Sivaganga, Rajah Doraisingam Memorial College. 2	Do.
9.	Tuticorin, St. Mary's College for Women. 2	Do.
10.	Vellore, Voorhees' College. 2	Do.
11.	Anantapur, Government Arts College. 2	Intermediate, B.A. & B.Sc.
12.	Bangalore, St. Joseph's College. 2	Do.

* The course in M.Ed. is on a conjoint basis and with the assistance of the University Department of Psychology.

(*a*) Classes not conducted.

	Names of Colleges	*Courses taught.*
13.	Chittur (Cochin) Government Arts College. 3	Intermediate & B.A.
14.	Coimbatore, Government Arts College. 1	Intermediate, B.A., B.O.L. & B.Com.
15.	Ernakulam, Maharaja's College. 3	Intermediate, B.A., B.Sc. & B.Sc. (Hons.).
16.	Do. St. Alberts' College. 2	Intermediate & B.A
17.	Do. St. Teresa's College (Women). 3	Intermediate & B.A.
18.	Feroke, Farook College. 2	Intermediate & B.A.
19.	Karaikudi, Dr. Alagappa Chettiar College. 2	Intermediate, B.A., B.Sc. & B.Com.
20.	Kumbakonam, Government College. 1	Intermediate, B.A. & B.Sc.
21.	Kurnool, Osmania College. 2	Intermediate, B.A., B.Sc., B.Com. & B.O.L..
22.	Madanapalle, Besant Theosophical College. 2	Intermediate & B.A.
23.	Madura, American College. 2	Intermediate, B.A., B.Sc. & B.Com.
24.	Do. Madura College. 2	Do.
25.	Mangalore, Government College. 1	Intermediate, B.A. & B.Com.
26.	Do. St. Agnes College (Women). 2	Intermediate & B.A.
27.	Mangalore St. Aloysius' College. 2	Intermediate, B.A., B.Sc. & B.Com.
28.	Palamcottah, Sarah Tucker College (Women). 2	Intermediate & B.A.
29.	Palamcottah, St. John's College. 2	Intermediate and B.A.
30.	Do. St. Xavier's College. 2	Do.
31.	Palghat, Government Victoria College. 1	Intermediate, B.A. & B.Sc.
32.	Pudukottai, H. H. The Raja's College. 1	Intermediate and B.A.
33.	Salem, Salem College. 2	Intermediate & B.A.
34.	Tambaram, Madras Christian College. 2	Intermediate, B.A., B.Sc., B.A. (Hons.) & B.Sc. (Hons.)
35.	Tellicherry, Goverment Brennen College. 1	Intermediate and B.A.
36.	Thevara (Ernakulam), Sacred Heart College. 3	Intermediate, B.A., B.Sc. & B.Com.
37.	Tinnevelly, Madura Diraviyam Thayumanavar Hindu College. 2	Intermediate & B.A.
38.	Tirupati, Sree Venkateswara College. 2	Do.

Names of Colleges.	Courses taught.
39. Trichinopoly, Holy Cross College (Women). 2	Intermediate & B.A.
40. Trichinopoly, National College. 2	Do.
41. Do. St. Joseph's College. 2	Intermediate, B.A., B.Sc., B.Com. B. A. (Hons.) & B. Sc. (Hons.)
42. Trichur, Sree Kerala Varma College. 3	Intermediate, B.A., B.O.L. & B.Com.
43. Trichur, St. Mary's College (Women). 3	Intermediate & B.A.
44. Trichur, St. Thomas' College. 3	Do.
45. Vaniyambadi, Islamiah College. 2	Intermediate, B.A. & B.Com.
46. Virudhunagar, Senthikumara Nadar College. 2	Intermediate & B.A.

FACULTY OF AGRICULTURE.

Coimbatore, Agricultural College. 1	B.Sc. (Ag.)

FACULTY OF MEDICINE.

Vellore, Christian Medical College. 2	Pre-Registration & M.B.B.S. Course.

FACULTY OF ENGINEERING.

Anantapur, College of Engineering. 1	B.E.
Coimbatore, (Peelamedu) Arthur Hope College of Technology.	B.E.

FACULTY OF TEACHING

Mangalore, St. Ann's Training College (Women). 2	B.T.
Trichur, Government Training College. 3	Do.

FACULTY OF COMMERCE.

1. Coimbatore, Government Arts College. 1	B.Com.
2. Karaikudi, Dr. Alagappa Chettiar College. 2	Do.
3. Kurnool, Osmania College. 2	Do.
4. Madura, American College. 2	Do.
5. Do. Madura College. 2	Do.
6. Mangalore, Government College. 1	Do.
7. Do. St. Aloysius' College. 2	Do.
8. Thevara (Ernakulam), Sacred Heart College. 3	Do.
9. Trichinopoly, St. Joseph's College. 2	Do.
10. Trichur, Sree Kerala Varma College. 3	Do.
11. Vaniyambadi, Islamiah College. 2	Do.

ORIENTAL TITLE EXAMINATIONS.

FACULTY OF ORIENTAL LEARNING

1. Dharmapuram, Oriental College.
2. Feroke (S. Malabar), Rawzathul Ulloom Arabic College.
3. Karkala (South Kanara), S. B. S. Sanskrit College.
4. Kurnool, Madrasa Islamiah Arabic College.
5. Madras, Sanskrit College and Swaminatha Sastri Vedanta Patasala, Mylapore.
6. Madras, Sri Venkataramana Dispensary and Ayurvedic College, Mylapore.
7. Madura, Rameswaram Devastanam Patasala.
8. Madurantakam (Chingleput), Sri Ahobila Mutt Free Sanskrit College.
9. Mailam (South Arcot), Sri Sivagnana Balaya Swamigal Tamil College.
10. Melasivapuri (Pudukottai), Ganesar Sentamil Kalloori.
11. Omerabad (North Arcot), Jamalia-i-Darus-Salam.
12. Pattambi (South Malabar), Sri Nilakanta Central Sanskrit College.
13. Pavaratti (South Malabar), Sahitya Dipika Sanskrit College.
14. Perdala (South Kanara), Mahajana Sanskrit College.
15. Pulikkal (S. Malabar), Madeenathul Uloom Arabic College.
16. Puthucode (South Malabar), Harihara Sanskrit College.
17. Rayadrug (Bellary), Madrasai-Muhammadiya Arabic College.
18. Sholinghur (North Arcot), Veda Vedanta Bodhini Sanskrit College.
19. Sriperumbudur (Chingleput Dt.), Sanskrit College.
20. Tanjore, Karanthai Pulavar Kalloori.
21. Tiruppanandal (Tanjore Dt.), Sri Kasivasi Swaminatha Swamigal Tamil Kalloori.
22. Tirupati (Chittoor Dt.), Sri Venkateswara College for Oriental Learning.
23. Tiruvadi (Tanjore Dt.), Raja's College of Sanskrit and Tamil Studies.
24. Udipi (South Kanara), Dwaita Vedanta Sanskrit College.
25. Vellore (North Arcot Dt.), Bakiyatussalahat Arabic College.

FACULTY OF FINE ARTS

Institution approved for the Sangita Siromani Course.

Madras (Adyar), Kalakshetra.

4. The application* and thesis must be forwarded so as to be received by the Registrar on any day in the month of January or August of any year.

Examination of Thesis.

5. The thesis, together with any other contributions and papers submitted, shall in the first instance be forwarded to a Board consisting of the President of the Faculty of Law, the Chairman of the Board of Studies in Law, and such other expert as the Syndicate may consider necessary, for scrutiny as to its suitability for submission for the Degree, and, if found suitable, it shall be referred by the Syndicate for report to a Board of three Examiners, one of whom shall be a recognized Teacher of Law; at the discretion of the Board of Examiners the candidate may be asked to submit to an oral examination; provided, however, it shall be competent for the Syndicate, in the case of a Board of Examiners outside India, to arrange for the holding of an oral examination by a Board of Examiners in this country, should the first mentioned Board of Examiners consider this necessary prior to coming to a decision; and after receipt from the Board of its report on the thesis and on the oral examination, if any, the Syndicate shall decide whether the candidate has qualified for the Degree or not. The decision of the Syndicate shall be published in the *Fort St. George Gazette.*

Number of chances.

6. A candidate shall not be permitted to submit a thesis for the Degree on more than two occasions; provided, however, it shall be competent for the Syndicate, after having taken into consideration the remarks of the Board of Examiners, to permit a candidate to submit a thesis on a third occasion.

Publication of Thesis.

7. Successful candidates shall publish their theses before the award of the Doctorate Degree at a Convocation and shall inscribe it "Thesis approved for the Degree of Doctor of Laws in the University of Madras". Other candidates shall be at liberty to publish their theses, but not under the name of the University.

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*The fee prescribed for applying for the LL.D. Degree is Rs. 250/-.

CHAPTER LXI.

*Degree of Bachelor of Medicine and Surgery.

Preliminary qualifications.

1. (a) Candidates for the Degree of Bachelor of Medicine and Surgery shall be required—

Age limit for admission.

(i) to have completed the age of seventeen years on or before the date of admission to the course of First M.B. & B.S. in a college of Medicine;

(ii) to have passed the Intermediate Examination in Arts and Science of this University or an examination of some other recognised University accepted by the Syndicate as equivalent thereto having offered Physics and Chemistry as two of the three optional subjects;

Pre-Registration Examination.

(iii) to have subsequently studied for a period of two terms in a college affiliated to or recognised by the University the subjects of Inorganic Chemistry, Physics and Natural Science and passed the Pre-Registration Examination of this University or an examination recognised by the Medical Council of India and accepted by the Syndicate as equivalent thereto ;

Five years' course of study at Medical College.

(iv) to have, subsequent to passing the Pre-Registration Examination of this University or an examination accepted as equivalent thereto, been engaged for not less than five academic years in professional study in a College of Medicine affiliated to or recognised by the University, two years of which should be spent in the study of the pre-clinical subjects and not less than three years in the study of the clinical subjects subsequent to passing the First M.B. & B.S. Examination, provided that the fourth and fifth years of the course of studies prescribed for the Final M.B. & B.S. Examination be spent in attendance at the University of Madras.

(*b*) (1) Candidates who have passed the Intermediate Examination in Arts and Science of this University under the New Regulations where a practical test has been prescribed will be admitted to the Medical course proper if

* For Regulations in force prior to 1928, *vide* APPENDIX XIX of Vol. I, Part II of the University Calendar for 1931-32.

they have offered the subjects of Physics, Chemistry and Natural Science as three of the optional subjects for the Intermediate.

(2) Candidates who have passed the Intermediate Examination under the Old Regulations offering Physics, Chemistry and Natural Science will be permitted to sit for the practical test in Physics, Chemistry, and Natural Science, and such candidates as obtain the minimum prescribed for the practical test will be deemed qualified for admission to the Medical course proper.

Candidates who have passed the Intermediate Examination under the Old Regulations offering Physics and Chemistry and any other subject should qualify for Natural Science under the New Regulations and take the practical test in Physics and Chemistry before applying for admission to the Medical College.

(3) Candidates who have taken a higher examination, B.Sc. (Hons.), B.A. or B.Sc., shall be admitted to the Medical course proper if they have taken Physics and Chemistry as two of the subjects either of the Main or Subsidiary standard, but such candidates should undergo a course for Natural Science and pass the examination as per the present syllabus for Pre-Registration before appearing for Part II of the First M.B. & B.S. Examination.

(4) Candidates who have passed the Intermediate Examination with Physics, Chemistry, and Natural Science under the Old Regulations and have taken the Degree course in any of the subjects, Physics, Chemistry or Natural Science shall be admitted to the Medical course and exempted from the particular subjects in which they have passed the Examination either of the Main or Subsidiary standard, but such candidates should sit for the Practical test (Intermediate) in the subject or subjects in which they have not taken a higher course of study.

Note.—A candidate who has passed the B.A. Degree Examination in Physics with Mathematics and who desires to join the Medical College should sit for the practical test in Chemistry and should in the first year of the Medical course sit for the Natural Science Examination according to the Pre-Registration syllabus and pass the examination if he had not taken Natural Science in the Intermediate under the Old Regulations, while a candidate who has

passed the B.Sc. Degree in Physics and Chemistry and any other subject should likewise sit for Pre-Registration in Natural Science if he had not taken Natural Science in the Intermediate under the Old Regulations.

A candidate who has taken Natural Science in the Intermediate (Old Regulations) and has graduated in other subjects should sit for the practical test in Natural Science (Intermediate).

A B.A. or B.Sc. who has taken Zoology, Botany, and Chemistry should sit for the practical test in Physics and pass that examination in the first year of the Medical course.

A candidate who has taken Zoology and Botany, and any other subject excepting Physics and Chemistry for the B.A. or B.Sc. must sit for the Physics and Chemistry practical test for the Intermediate and pass the test during the first year of the Medical course.

This concession is applicable for a period of three years (December 1950) and will extend to candidates from the Andhra and Annamalai Universities only.

Candidates of other Universities should have passed the Intermediate in Science (Medical Group) with practical tests to be eligible for the Medical course proper.

The Pre-Registration Examination will continue to be held for the benefit of such students as do not comply with the above Regulations.

NOTE.—Candidates who are studying in the B.A., B.Sc. or B.Sc. (Honours) course may appear for the practical test for the Intermediate in the subjects concerned if they had already passed the Intermediate Examination under the Old Regulations with these subjects taken as optionals.

Academic Terms.

2. The academic year shall consist of three terms, spring, autumn and winter. The spring term shall extend from 1st January to 31st March, the autumn term from 1st July to 30th September and the winter term from 1st October to 31st December.

Examinations to be passed.

3. Candidates for the Degree of M.B. & B.S. shall be required to pass three examinations, *viz.*,

(*a*) *First M.B. & B.S. Examination—*

Part I—Organic Chemistry,

Part II—Anatomy and Physiology including Biochemistry.

(*b*) *Second M.B. & B.S. Examination—*

Part I—Pharmacology,

Part II—Pathology and Bacteriology, and Hygiene and Preventive Medicine.

(*c*) *Third or Final M.B. & B.S. Examination—*

Part I—Forensic Medicine, and Ophthalmology,

Part II—Medicine, Surgery, Obstetrics and Gynaecology.

Certificates of further study for failed and other candidates.

4. In the case of the examinations other than Part II of the Final M.B. & B.S., candidates who fail at the examination, or having applied for admission do not appear for the examination, or having obtained the prescribed certificate do not apply for admission to the examination although qualified to do so, shall be required to produce a certificate of further study for the period between the last examination at which they had failed or not appeared and the next succeeding examination.

No candidate who failed in any of the subjects of Part II of the Final M.B. & B.S. Degree Examination shall be permitted to appear again for the examination unless he puts in a further attendance at hospital practice in the subject or subjects in which he has failed, for the period between the examination at which he failed and the next succeeding examination.

In the case of candidates who do not appear for the next succeeding examination, the period of further study shall be decided by the Principal of the College concerned, provided that such study does not exceed two terms.

Dates of Examinations.

5. The examinations shall be held twice a year in the months of December and April and shall ordinarily commence on the following dates*:—

Pre-Registration Examination—

1st April and 10th December.

First and Second M.B. & B.S. Examinations—

1st April and 1st December.

Final M.B. & B.S. Degree Examination—

1st April and 1st December.

PRE-REGISTRATION EXAMINATION.

Course of study and Examination.

6. A candidate for the examination shall have undergone a course of study extending over a period of two terms and shall be examined in the following subjects according to syllabus:—

(a) Inorganic Chemistry

(b) Physics

(c) Natural Science

The examination in each subject shall consist of a written and a practical test.

Qualifications for admission.

7. No candidate shall be admitted to the examination unless he has produced satisfactory evidence of having complied with the provisions contained in Regulation 1(*a*) (ii) above and has produced the prescribed certificates of study.

Exemption in subjects.

8. (1) Candidates who have passed Part II (Old Regulations) or Part III (New Regulations) of the B.A. Degree or Part II of the B.Sc. (Pass) or B.Sc. (Honours) or B.A. (Honours) (Old Regulations) Degree Examination of the Madras University with Physics or Chemistry (as main or subsidiary subjects) or Botany and Zoology (together) as optional subjects or have obtained a degree in any of these subjects in any other Indian University

**Vide* Ordinance—Chapter XXXVIII.

(where practical courses and examinations are held) accepted by the Syndicate as equivalent thereto, shall not, however, be required to produce the prescribed certificates for or to pass in any of the subjects in which they have passed at the Degree Examination, provided that Physics and Chemistry have been passed in the main or subsidiary standard and Botany and Zoology have been taken together.

(2) Candidates who have passed the B.Sc. (Honours) or B.A. (Honours) Degree Examination or the B.Sc. or B.A. Degree Examination of the Madras University or an examination accepted as equivalent thereto of any Indian University with Chemistry as the Main subject of study and examination will be exempted from Part I of the First M.B. & B.S. Examination, *viz.*, Organic Chemistry.

(3) Candidates who have passed the B.Sc. (Pharmacy) Degree Examination of this University shall be exempted from being examined in Inorganic Chemistry of the Pre-Registration Examination and Organic Chemistry (Part I) of the First M.B. & B S. Examination.

Such candidates shall, however, be required to pay the prescribed fee for the whole examination.

Scheme of Examination. 9. The examination shall include—

(a) Inorganic Chemistry—One paper (3 hours) and a practical examination (candidates' work as well as evaluation by the Examiners) not exceeding three hours.

(b) Physics—One paper (3 hours) and a practical examination (candidates' work as well as evaluation by the Examiners) not exceeding three hours.

(c) Natural Science—One paper (3 hours) and a practical examination (candidates' work as well as evaluation by the Examiners) not exceeding three hours.

Candidates other than those exempted under Regulation 8 must at their first appearance present themselves in all the three subjects.

Marks qualifying for a pass.

10. A candidate shall be declared to have passed the examination if he obtains not less than 35% in the written and 35% in the practical tests in each of the subjects, Inorganic Chemistry, Physics and Natural Science. All the other candidates shall be deemed to have failed in the examination.

Exemption from re-examination in subjects.

Candidates for the examination who fail but obtain 40% in each of the written and the practical parts in any subject shall be exempted from re-examination in that subject.

Classification of successful candidates.

11. Candidates who pass the whole examination at the first appearance shall be ranked in the order of proficiency as determined by the total marks obtained by each. Candidates who obtain not less than 60% of the marks in any subject shall be declared to have passed with distinction in that subject.

All candidates who pass the examination subject by subject shall be placed in a separate list.

Time limit for passing the Examination.

12. Any candidate who after qualifying for admission to the examination, applies therefor and fails four times, shall not be permitted to sit for the Pre-Registration Examination again. A candidate whose name has been registered for the examination but who absents himself therefrom from whatever cause shall be deemed to have failed in the examination.

Further study for failed candidates.

13. Candidates who fail in the whole examination or in any part thereof shall be required to produce a certificate of further study which shall extend to the next succeeding examination.

First M.B. & B.S. Examination.

Course of study.

14. A candidate before presenting himself for the First M.B. & B.S. Examination shall produce certificates of having attended the recognised courses of instruction in ithe following subjects:—

(i) A course of lectures in Organic Chemistry includng practical classes extending over at least two terms.

(ii) A course of lectures and demonstrations on Anatomy including elements of Human Embryology with special reference to their application to the clinical studies, extending over at least five terms which shall include the dissection of the whole body to the satisfaction of the teachers.

(iii) A course of lectures and demonstrations on Physiology including Biophysics and Biochemistry extending over at least five terms.

(iv) A practical course in Histology, Experimental Physiology, Biophysics and Biochemistry during this period.

(v) A course of instruction in Elementary Normal Psychology.

(vi) The normal reactions of the body to injury and infection as an introduction to General Pathology and Bacteriology.

(vii) Elements of the methods of clinical examination including the use of the common instruments and the examination of body fluids with demonstrations on both normal and abnormal living subjects.

(viii) An introduction to Pharmacology.

Note.—Instruction under the last three headings shall be given for one term during the second academic year by arrangement and in co-operation with the teachers of the clinical subjects concerned.

A candidate shall produce evidence of having passed a test conducted by the college in the above three subjects, prior to the date of the examination.

Scheme of Examination. 15. The First M.B. & B.S. Examination shall consist of two parts:—

Part I—Organic Chemistry.

Part II—Anatomy including elements of Human Embryology,

Physiology including Biophysics and Biochemistry.

The examination in Organic Chemistry shall consist of—

(1) a paper of 3 hours' duration;

(2) a practical examination (candidates' work as well as evaluation by the Examiners) not exceeding three hours; and

(3) an oral examination.

The examination in Anatomy shall consist of—

(1) a paper of 3 hours' duration;

(2) a practical examination (candidates' work as well as evaluation by the Examiners) not exceeding three hours; and

(3) an oral examination.

The examination in Physiology shall consist of—

(1) a paper of 3 hours' duration;

(2) a practical examination (candidates' work as well as evaluation by the Examiners) not exceeding three hours in Experimental Physiology and Histology;

(3) a practical examination (candidates' work as well as evaluation by the Examiners) not exceeding two hours in Biochemistry; and

(4) an oral examination.

Submission of Laboratory Note-books.

Candidates shall bring to the practical examination in Physiology their original laboratory note-books certified by their teachers as being the actual working notes made by the candidates in the laboratory for the inspection of the examiners. Candidates may use their own practical note-books (but not text-books) at the practical examinations in Organic Chemistry and Biochemistry. At the practical and oral examinations, reference may be made by the examiners to the candidates' class records.

Examination may be taken in two parts.

16. Candidates may present themselves for the whole examination at one time or may take the examination in two parts.

Part I of the examination may be taken at the end of the first year of study, and Part II at the end of the second year of study.

Eligibility for admission—period of study.

No candidate shall be admitted to any part of the examination unless (1) he has passed the Pre-Registration Examination of this University or an examination accepted by the Syndicate as equivalent thereto; (2) he has produced satisfactory evidence of having complied with the provision in Regulation 1 (*a*) (i) above, and (3) he has produced the prescribed certificates of study.

Marks qualifying for a pass.

17. A candidate shall be declared to have passed Part I of the examination if he obtains not less than one-half of the marks in the written and oral parts taken together and not less than one-half of the marks in the practical examination.

A candidate shall be declared to have passed Part II of the examination if he obtains not less than one-half of the marks in the written and oral parts taken together in each of the subjects, Anatomy (including Elements of Human Embryology) and Physiology (including Biophysics and Biochemistry) respectively, and not less than one-half of the marks in the practical examination in each subject. All the other candidates shall be deemed to have failed in the examination.

Classification of successful candidates.

18. Candidates who pass Parts I and II of the examination on the first occasion of appearing therefor shall be ranked in the order of proficiency as determined by the total marks obtained by each in both parts and shall be arranged in two classes, the first consisting of those who have obtained not less than 70% of the aggregate marks, the second consisting of all the others.

Candidates who pass in the first class and who obtain not less than 75% of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

All candidates who pass the examination subject by subject shall be ranked in the second class separately.

Exemption from re-examination in subjects.

19. Candidates who fail in the examination but obtain passing marks in any subject, Organic Chemistry, Anatomy or Physiology, shall be exempted from re-examination in that subject.

Further study for failed candidates.

20. Candidates who fail in any subject shall be required to produce a certificate of further study for the period which shall extend to the next succeeding examination.

SECOND M.B. & B.S. EXAMINATION.

Qualifications for admission.

21. No candidate shall be admitted to the Second M.B. & B.S. Examination unless he has passed the First M.B. & B.S. Examination of this University or an examination of some other recognised University accepted by the Syndicate as equivalent thereto, and has undergone a course of study extending over a period of one academic year for Pharmacology, Hygiene and Preventive Medicine, and two academic years for Pathology and Bacteriology taken concurrently and subsequent to passing the First M.B. & B.S. Examination.

Course of study.

22. The course of instruction in Pharmacology shall include demonstrations in Experimental Pharmacology illustrating the action of drugs on living tissues.

The course of instruction in Hygiene and Preventive Medicine shall be designed to meet the needs of general medical practitioners.

The course in Pathology shall include—

(a) instruction in General Pathology, Morbid Anatomy and Bacteriology including practical work in the subject;

(b) attendance in the post-mortem room including the performance of the duties of a post-mortem clerk in at least ten cases (for one term) and practical experience in making post-mortem examinations; and

(c) attendance in a clinical laboratory of a recognised institution during a period of one term.

Scheme of Examination.

23. The examination shall consist of two parts:—

Part I—Pharmacology.

Part II—(a) Hygiene and Preventive Medicine.
(b) Pathology with Bacteriology.

The examination in each of the subjects, Pharmacology, Hygiene and Preventive Medicine, and Pathology with Bacteriology shall consist of—

(1) a paper of three hours' duration,

(2) a practical examination, and

(3) an oral examination.

Examination may be taken in parts or in whole—conditions.

24. Candidates may present themselves for the whole examination at one time or may take the examination in two parts, provided that the examination in Part I may be taken at the end of one academic year while the examination in Part II shall be taken only after two academic years of study are completed subsequent to passing the First M.B. & B.S. Examination of this University or an examination of some other recognised University accepted by the Syndicate as equivalent thereto, and the prescribed certificates of study are produced.

Marks qualifying for a pass.

25. A candidate for the Second M.B. & B.S. Examination shall be declared to have passed Part I of the examination if he obtains not less than one-half of the marks in the written and oral examinations taken together and not less than one-half of the marks in the practical examination in the subject.

A candidate shall be declared to have passed Part II of the examination if he obtains not less than one-half of the marks in the written and oral examinations taken together in each of the subjects, Hygiene and Preventive Medicine and Pathology with Bacteriology, and not less than one-half of the marks in the practical examination in each of these subjects. All the other candidates shall be deemed to have failed in the examination.

Classification of successful candidates.

26. Candidates who pass Parts I and II of the examination on the first occasion of appearing therefor shall be ranked in the order of proficiency as determined by the total marks obtained by each in both parts and shall be arranged in two classes, the first consisting of those who have obtained not less than 70% of the aggregate marks, the second consisting of all the others.

Candidates who pass in the first class and who obtain not less than 75% of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

All candidates who pass the examination subject by subject shall be ranked in the second class separately.

Exemption from re-examination in subjects

27. Candidates who fail in the examination but obtain passing marks in a subject shall be exempted from re-examination in that subject.

Further study for failed candidates.

28. Candidates who fail in any subject shall be required to produce a certificate of further study for the period which shall extend to the next succeeding examination.

FINAL M.B. & B.S. DEGREE EXAMINATION.

Course of study.

29. The course of study shall extend over three years which shall be spent at a hospital or hospitals recognised by the University and shall cover courses in Forensic Medicine, Ophthalmology, Medicine, Surgery, Obstetrics and Gynaecology, as well as the special subjects mentioned in the curriculum.

The course in Ophthalmology shall include attendance at an Ophthalmic Hospital or the Ophthalmic wards of a General Hospital for three days in the week for a period of three months.

No candidate shall be permitted to enter on his fifth or final year of medical study unless he has passed the Second M.B. & B.S. Examination previously.

Notwithstanding anything contained to the contrary in the Regulations, it shall be competent for candidates who completed subjects, other than Ophthalmology, of the Second M.B. & B.S. Examination of December 1946 or earlier to proceed to the fifth or final year course of study and to appear for the subject of Ophthalmology as Part I of the Final M B. & B.S. Examination.

Examination may be taken in parts.

30. The Final M.B. & B.S. Examination is divided into two parts:—

Part I—(a) Forensic Medicine, and

(b) Ophthalmology.

Part II—(a) Medicine including Therapeutics and Mental Diseases,

(b) Surgery, and

(c) Obstetrics and Gynaecology.

31. A candidate may appear for Part I of the examination after undergoing the necessary courses and subsequent to passing the Second M.B. & B.S. Examination.

32. At the commencement of the three years' clinical period of training, every student shall attend an introductory course of instruction in Clinical Pathology, Clinical Medicine and Clinical Surgery.

Medicine.

Detailed course of study—duration.

33. The course in Medicine shall include—

(i) Instruction in the Principles and Practice of Medicine including Clinical Pathology and laboratory methods, the application of Physiology and Anatomy to the investigation of disease and the methods of prevention of disease.

(ii) (a) An appointment for six months as clinical clerk in the medical wards of a recognised hospital.

(b) An appointment for three months as clinical clerk in the Medical Out-patient Department of a recognised hospital.

This appointment may run concurrently with (a) above.

(iii) Instruction in—

(a) Children's Diseases, including one month's appointment as clinical clerk in the Children's ward of a recognised hospital.

(b) Dermatology—Attendance at a Dermatological clinic with 12 clinical lecture demonstrations.

(c) Infectious Diseases—A course of 8 clinical lecture demonstrations in a recognised Fever Hospital.

(d) Mental Diseases—Attendance at a recognised Mental Hospital with 12 clinical lecture demonstrations.

(e) Physio-therapy.

(f) Psychology in relation to Medicine.

(g) Radiology in its application to Medicine.

(h) Instruction in vaccination by a qualified Health Officer with six lecture demonstrations.

(i) Attendance at a recognised Tuberculosis Hospital with 12 clinical lecture demonstrations.

(j) Medical Therapeutics.

In all the above subjects clinical or practical instruction shall, as far as possible, take the place of systematic lectures. Questions on the subjects under (iii) above may be included in the examination in Medicine but separate examination in those subjects will not be held.

Surgery.

Detailed course of study—duration.

34. The course in Surgery shall include—

(i) Instruction in the Principles and Practice of Surgery including Clinical Pathology and laboratory methods, the application of Physiology and Anatomy to the investigations of disease and the methods of prevention of disease.

(ii) An appointment for six months as Surgical Dresser in the wards of a recognised hospital.

(iii) An appointment for three months as Surgical Dresser in the Out-patient Department of a recognised hospital.

This appointment may run concurrently with (ii) above.

(iv) Instruction in—

(a) Anaesthetics with six clinical lecture demonstrations.

(b) Dental Surgery.

(c) Operative Surgery.

(d) Orthopaedic Surgery.—Attendance in the special departments with 12 clinical lecture demonstrations.

(e) Oto-Rhino-Laryngology.—Attendance at a recognised clinic with 12 clinical lecture demonstrations.

(f) Radiology in its application to Surgery.—Attendance at a Radiological Institute with 12 clinical lecture demonstrations to cover medical and surgical Radiology.

(g) Venereal Diseases.—Attendance at a Venereal Clinic with 12 clinical lecture demonstrations.

In all the above subjects clinical or practical instruction shall, as far as possible, take the place of systematic lectures. Questions on the subjects under (iv) above may be included in the examination in Surgery but separate examination in those subjects will not be held.

Obstetrics and Gynaecology.

Detailed course of study—duration.

35. (1) The course in Obstetrics and Gynaecology shall include instruction in the Principles and Practice of Obstetrics and Gynaecology including the Applied Anatomy and Physiology of pregnancy and labour and the method of prevention of diseases.

(2) The minimum period of study devoted to Clinical Obstetrics and Gynaecology shall be six months subsequent to the performance of duties as a medical clerk and surgical dresser. During this period, the hours of instruction shall be so allotted that at least two-thirds are given to Obstetrics including Ante-natal Care and the Hygiene of Infants. The course shall include—

(a) Two months' attendance in a Maternity Hospital or the maternity wards of a General Hospital. During this period the student shall, wherever practicable, be resident in the hospital or a hostel attached thereto.

(b) The personal conduct of twenty labours under supervision, at least five of which must be in the hospital.

(c) Clinical clerking in the Gynaecological wards and Out-patient Department of a recognised hospital for at least two months.

Throughout the six months, the student shall receive practical instruction in the wards and Out-patient Department of the Maternity Hospital in the principles of—

(1) Ante-natal and Post-natal Care;
(2) the management of the puerperium; and
(3) the care of the new-born infant.

Scheme of Examination.

36. The scheme of examination shall be follows :—

Part I—*Forensic Medicine*—One paper of 3 hours' duration and an oral examination.

Ophthalmology—One paper of 3 hours' duration, a clinical examination and an oral examination of 3 hours' duration.

Part II—*Medicine*—(a) Two papers each of 3 hours' duration;

(b) a clinical examination in Medicine consisting of—

(i) an examination of a patient and a written report thereon;

(ii) an oral examination on a case or cases, and

(c) an oral examination.

Surgery—Two papers each of 3 hours' duration. A clinical examination in Surgery. An examination in Operative Surgery and an oral examination.

Obstetrics and Gynaecology—One paper of three hours' duration. A clinical examination in Obstetrics and Gynaecology. An oral examination including questions on specimens and appliances.

Conditions of admission to Examinations.

37. No candidate shall be admitted to the examination (either Part I, or Part II, or whole) unless (1) he has previously passed the Second M.B. & B.S. Examination of this University or an examination of some other recognised University accepted by the Syndicate as equivalent thereto, (2) he has produced the prescribed certificates, and (3) he has produced satisfactory evidence of having complied with the provisions in Regulation 1 (*a*) (iv) above.

No candidate shall be permitted to appear for the Final M.B. & B.S. Part II Examination unless he produces a certificate of hospital attendance for at least one term prior to the date of appearance at the examination,

Marks qualifying for a pass.

38. A candidate for Part I of the Final M.B. & B.S. Examination shall be declared to have passed the examination if he obtains—

(a) not less than one-half of the marks in the written and oral examinations in Forensic Medicine taken together;

(b) (i) not less than one-half of the marks in the written and oral examinations in Ophthalmology taken together; and

(ii) not less than one-half of the marks in the clinical examination in Ophthalmology.

A candidate shall be declared to have passed Part II of the Final M.B. & B.S. Examination if he obtains—

(a) (i) not less than one-half of the marks in the written and oral examinations in Medicine taken together, and

(ii) not less than one-half of the marks in the clinical examination in that subject;

(b) (i) not less than one-half of the marks in the written, practical and oral examinations in Surgery taken together, and

(ii) not less than one-half of the marks in the clinical examination in that subject; and

(c) (i) not less than one-half of the marks in the written and oral examinations in Obstetrics and Gynaecology taken together, and

(ii) not less than one-half of the marks in the clinical examination in that subject.

All the other candidates shall be deemed to have failed in the examination.

Classification of successful candidates.

39. Candidates who pass Parts I and II of the examination on the first occasion of appearing therefor shall be ranked in the order of proficiency as determined by the total marks obtained by each in both parts and shall be arranged in two classes, the first consisting

of those who have obtained not less than 70% of the aggregate marks and the second consisting of all the others.

Candidates who pass in the first class and who obtain not less than 75% of the marks in any subject shall be deemed to have passed with distinction in that subject.

Candidates who pass Parts I and II of the examination at a subsequent appearance shall be ranked only in the second class.

All candidates who pass the examination subject by subject shall be ranked in the second class separately.

Exemption from re-examination in subjects.

40. Candidates who fail in the examination but obtain passing marks in any subject shall be exempted from re-examination in that subject.

Time limit for qualifying for the Degree.

41. Candidates appearing for the Final M.B. & B.S. Examination shall complete Part II of the examination in Medicine, Surgery, and Obstetrics and Gynaecology within a period which ordinarily shall not exceed 24 months from the date of the first appearance for Part II of the examination. Such candidates as do not pass all the subjects of Part II within this period shall be required to take the entire examination again.

Further study for failed candidates.

42. Candidates who fail in Ophthalmology under Part I or in Part II of the Final M.B. & B.S. Examination or in any subject thereof shall be required to put in an additional course of hospital attendance for a period which shall extend up to the next succeeding examination.

Transitory Regulations.

43. Candidates who have commenced their medical courses of study and are undergoing the same in any of the Medical Colleges of the University before the 1st January 1940, under the Regulations in force before the above date, (Chapter LIV, Volume I, Part II of the University Calendar, 1939-40), shall continue their studies and proceed to the Degree under the same Regulations, subject to such alterations to those Regulations, if any, as may be made from time to time, and also subject to the following transitory provisions :

No candidate shall be permitted to appear for the Final M.B. & B.S. Part II Examination unless he

produces a certificate of hospital attendance for at least one term prior to the date of appearance at the examination.

A candidate who fails in any examination, First, Second or Final M.B. & B.S., shall be required to put in an additional course of study for the period which shall extend up to the next succeeding examination.

L.M.P.'s to qualify for M.B. & B.S. Degree.

44. A candidate who holds the Government Diploma of L.M.P. of this Presidency or any other qualification accepted by the Syndicate as equivalent thereto shall be admitted to the courses for the Degree of M.B. & B.S., provided :

(i) that he has passed the Intermediate Examination in Arts and Science of this University or of some other Indian University accepted as equivalent thereto by the Syndicate irrespective of the subjects taken therein or possesses such other general educational qualifications as may be recognised by the Medical Council of India for admission to the medical courses of study ;

(ii) that he has subsequently passed the Pre-Registration Examination of this University ;

(iii) that Licentiates who have undergone the five years' course and obtained the Government Diploma of L. M. P. of the Madras Government shall be exempt from the Pre-Registration Examination ;

(iv) that he has subsequently passed the First M.B. & B.S. Examination of this University ;

(v) that he has attended a course of study and hospital practice including attendance in medical and surgical departments for not less than two academic years in a College of Medicine recognised by or affiliated to this University subsequent to passing the First M.B. & B.S. Examination of this University during which period he should have received instruction in the special subjects and in Applied Anatomy, Applied Physiology and Pathology ;

(vi) that he has held the appointment as Clinical Clerk at the Gynaecological Wards, the

Ante-natal Clinic and the Maternity Wards of a lying-in-Hospital for a period of three months and has personally conducted 20 cases of labour of which 5 should have been under supervision ; and

(vii) that he has passed the Second M.B. & B.S. Examination and Parts I and II of the Final M.B. & B.S. Examination, provided that Part I of the Final M.B. & B.S. Examination may be taken eighteen months after passing in Anatomy and Physiology.

45. A candidate who holds the Government Diploma of L.M.P. of this Presidency or any other qualification accepted by the Syndicate as equivalent thereto shall be admitted to the course for the Degree of M.B. & B.S., provided—

(i) that he has passed the Matriculation Examination of this University or an examination accepted by the Syndicate as equivalent thereto ;

(ii) that he has subsequently undergone a course of study for the period mentioned below in a College of Medicine affiliated to or recognized by the University of Madras :—

(*a*) in the case of ordinary Licentiates—Two years

(*b*) in the case of Licentiate commissioned officers of I.A.M.C. who have not undergone three months' intensive course at A.M.T.C.—Two years

(*c*) in the case of Licentiate officers who have undergone 3 months' intensive course at A.M.T.C.—Eighteen months

(*d*) in the case of Licentiate officers with D.M.S. and other similar qualifications which involved medical studies for five years and have not undergone three months' intensive course at A.M.T.C.—Eighteen months

(*e*) in the case of Licentiate commissioned officers of I.A.M.C. with D.M.S. and other similar

qualifications which involved medical studies for five years and have undergone three months' intensive course at A.M.T.C. —Twelve months;

(iii) that he has undergone a course in Anatomy, Physiology including Biochemistry and Pharmacology concurrently with the courses in the clinical subjects ;

(iv) that he has attended a course of study and hospital practice for twelve months or one academic year in the clinical subjects ; and

(v) that he has passed Part II of the Second M.B. & B.S. and Final M.B. & B.S. Degree Examinations, provided that Part II of the Final M.B. & B.S. Examination shall be taken subsequent to passing Part II of the Second M.B. & B.S. Examination.

NOTE.—The Final Examination question papers will include questions on Applied Anatomy, Applied Physiology including Biochemistry and Applied Pharmacology.

Candidates who have joined and are now undergoing a course under the existing Regulations will have the option of coming under the revised Regulation.

46. The Old Regulations so far as they are applicable in regard to the L.M. & S. Degree shall continue to be applicable to those candidates who are entitled under the Old Regulations to these privileges.

The term "Old Regulations" means either the Regulations which came into force on the 1st July 1926, or the Regulations in force prior thereto.

47. Candidates for the M.B. & B.S. Degree who have qualified for the L.M. & S. Degree after a five years' course shall be exempted from re-examination in the subject in which they have obtained 50 per cent of the marks and from the production of additional attendance certificate in the other subjects:

Provided, however, it shall be competent for the Syndicate to allow candidates who have qualified for the L.M. & S. Degree after a five years' course to proceed to the M.B. & B.S. Degree under the conditions applicable to

L.M.P. or D.M.S. holders laid down in Regulation 45 *supra*, without putting in any additional attendance. Candidates appearing for the examination under this proviso will have to appear in all the subjects for which the D.M.S. candidates appear, irrespective of their previous performance and will not be entitled to any exemption in the subjects in which they have previously obtained 50 per cent as laid down in the above paragraph.

*CHAPTER LVIII.

Degree of Bachelor of Laws.

Eligibility for the B.L. Degree.

1. No candidate shall be eligible for the Degree of Bachelor of Laws unless he has taken a Degree in this University or a Degree in some other University accepted by the Syndicate as equivalent thereto, and has also passed the two examinations in Law.

First Examination in Law.

Qualification of candidates.

2. No candidate shall be admitted to the First Examination in Law, unless he forwards before the date of the commencement of the examination satisfactory evidence of having qualified for a Degree in this University, or a Degree in some other University accepted by the Syndicate as equivalent thereto, and of having undergone a course of study in the subjects prescribed for the examination in a Constituent or an Affiliated College for a period of one academic year.

Subjects for Examination.

3. Candidates for the First Examination in Law shall be examined in the following subjects:—

(i) Jurisprudence. (One paper).

(ii) Roman Law. (One paper).

(iii) The Law of Contracts, including Negotiable Instruments and Specific Relief. (Two papers),

(iv) The Law of Torts. (One paper).

(v) Indian Constitutional Law. (One paper).

Each paper shall be of three hours' duration, except the paper on Indian Constitutional Law which shall be of two hours' duration.

Marks qualifying for a Pass.

4. (a) A candidate shall be declared to have passed the Examination if he obtains not less than forty per cent of the total marks, and not less than one-third of the marks

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*For Chapters I to LVII *vide* Volumes I and II, University Calendar, 1948–49.

Note.—For details *re* Examination fees and dates of commencement of Examinations, etc., *vide* **Annexures III and IV.**

in each Division of the Examination. The Divisions shall be as follows:—

(i) Jurisprudence, Roman Law, and Indian Constitutional Law.

(ii) The Law of Contracts, including Negotiable Instruments and Specific Relief, and the Law of Torts.

All the other candidates shall be deemed to have failed in the Examination.

(b) A candidate who fails in the whole examination, but obtains not less than fifty per cent of the marks in any division shall be exempted from re-examination in the subjects included in the Division.

Classification of successful candidates.

5. Candidates who pass the whole examination at one appearance shall be ranked in the order of proficiency as determined by the total marks obtained by each, and shall be arranged in three classes:

The *first*, consisting of those who obtain not less than sixty per cent of the total marks.

The *second*, of those who obtain less than sixty per cent but not less than fifty per cent of the total marks.

The *third*, of those who obtain less than fifty per cent but not less than forty per cent of the total marks.

All candidates who pass the examination in compartments, Division by Division, shall be placed in the third class in a separate list.

B. L. Degree Examination.

Qualification of candidates.

6. No candidate shall be admitted to the B.L. Degree Examination unless he forwards before the date of the commencement of the examination, satisfactory evidence of having passed the First Examination in Law, and of having undergone a course of study in the subjects prescribed for the B.L. Degree Examination for one year in any Constituent or Affiliated College, after the date of the First Examination in Law at which the candidate passes:

provided that this Regulation shall not apply in the case of candidates who have, prior to the beginning of the academic year 1935–36, completed the prescribed course of study for the B.L. Degree Examination and have earned the attendance certificate for B.L. before passing the F.L. Examination.

Subjects for Examination.

7. Candidates for the B.L. Degree Examination shall be examined in the following subjects :—

(i) The Law of Property, with special reference to the Transfer of Property Act, the Indian Trusts Act and the Indian Easements Act. (Two papers).

Questions shall ordinarily be set only on such parts of the English Law of Property as deal with the general principles of the Law of Property and are calculated to enable students to appreciate the Indian Law of Property.

(ii) Hindu Law. (One paper).

(iii) Muhammadan Law. (One paper).

(iv) The Principles of Land Tenures in the Madras Presidency. (One paper).

(v) The Law of Evidence. (One paper).

(vi) Criminal Law (Indian Penal Code). (One paper).

Each paper shall be of three hours' duration, except the papers on Muhammadan Law, the Principles of Land Tenures and the Law of Evidence which shall be of two hours' duration each.

Marks qualifying for a Pass.

8. (a) A candidate shall be declared to have passed the Examination, if he obtains not less than forty per cent of the total marks and not less than one-third of the marks in each Division of the Examination. The Divisions shall be as follows :—

(i) The Law of Property and Madras Land Tenures.

(ii) Hindu Law and Muhammadan Law.

(iii) Criminal Law and the Law of Evidence.

All the other candidates shall be deemed to have failed in the examination.

(b) A candidate who fails in the whole examination but obtains not less than fifty per cent in any Division shall be exempted from re-examination in the subjects included in the Division.

Classification of successful candidates.

9. Successful candidates who pass the examination in one appearance shall be ranked in the order of proficiency as determined by the total marks obtained by each, and shall be arranged in three classes :

The *first*, consisting of those who obtain not less than sixty per cent of the total marks.

The *second*, of those who obtain less than sixty per cent but not less than fifty per cent of the total marks.

The *third*, of those who obtain less than fifty per cent but not less than forty per cent of the total marks.

All candidates who pass the examination in compartments, Division by Division, shall be placed in the third class in a separate list.

CHAPTER LIX

Degree of Master of Laws.

Eligibility for M. L. Degree.

1. No candidate shall be eligible for the Degree of Master of Laws unless he has taken the Degree of Bachelor of Laws of this University or a degree in some other University accepted by the Syndicate as equivalent thereto and has also passed the M. L. Degree Examination:

Provided, however, that graduates of other Universities shall not be eligible to appear for the examination unless they have resided for two academic years within the University limits or area, prior to the date of the examination, and have been under the supervision of the Principal or other permanent member of the Law College staff to whom a report shall be made once a month by the student in person.

Qualification of candidates for Examination.

No candidate shall be admitted to the examination for the Degree of Master of Laws unless he has passed not less than two years previously the examination for the Degree of Bachelor of Laws in this University or a Degree examination in some other University accepted by the Syndicate as equivalent thereto.

Each candidate must forward before the date of the commencement of the examination satisfactory evidence of having taken the Degree of Bachelor of Laws of this University, or a Degree of some other University accepted by the Syndicate as equivalent thereto.

Branches of Study.

2. Candidates for the Degree of Master of Laws shall be examined in one of the following branches:—

BRANCH I—JURISPRUDENCE.

1. Jurisprudence.
2. History of English Law.
3. Roman Law and general outline of the French and German Civil Law.
4. Ancient Law and Polity.
5. Legislation, method and interpretation.

BRANCH II—CONSTITUTIONAL LAW AND INTERNATIONAL LAW.

1. Constitutional Law—India and the British Commonwealth.
2. Constitutional Law—The United States, France and Switzerland.
3. Public International Law.
4. Private International Law.
5. Public Authorities, Corporations and Elections.

BRANCH III—CRIME AND TORT.

1. Theory of Crime and Punishment.
2. Development of Criminal Law and Procedure in England and in India.
3. Comparative Criminal Jurisprudence.
4. Torts—General Principles.
5. Torts—Specific Wrongs.

BRANCH IV—CONTRACTS INCLUDING MERCANTILE LAW.

1. Contracts—General Principles.
2. Contracts—Special Contracts.
3. Banking and Negotiable Instruments.
4. Company Law and Bankruptcy.
5. Insurance and Maritime Law (Merchant Shipping, Bills of Lading, Charter-parties and Collisions).

BRANCH V—HINDU, MUHAMMADAN AND OTHER PERSONAL LAWS.

1. Hindu Law—Domestic relations, inheritance and woman's property rights.
2. Hindu Law—The Joint Family.
3. Hindu Law Codes and Commentaries—The Artha Sastra and the Mimamsa.
4. Muhammadan Law and its history.
5. Statute Law in India relating to guardianship, marriage and succession.

BRANCH VI—PROPERTY.

1. Transfer of Property in England and India including trusts, settlements and conveyancing.
2. Transfer of Property in England and India—Sales, mortgages and leases.
3. Succession, testamentary and intestate.
4. Public Trusts and Charities.
5. Customary and Statute Law relating to Land Tenures in India.

Each paper shall be of three hours' duration and shall carry 100 marks.

(For Syllabuses, Text-books, etc., *vide* **Appendix XII.**)

Marks qualifying for a Pass.

3. Candidates who obtain not less than one-third of the marks in each paper of the Branch and not less than forty per cent on the whole, shall be declared to have passed the examination. All the other candidates shall be deemed to have failed in the examination.

Classification of successful candidates.

Successful candidates shall be ranked in the order of proficiency as determined by the total marks obtained by each and shall be arranged in three classes:

The *first*, consisting of those who obtain not less than sixty per cent of the total marks.

The *second*, of those who obtain not less than fifty per cent of the total marks.

The *third*, of those who obtain not less than forty per cent of the total marks.

The examiners shall be at liberty to bracket candidates when the difference between them amounts only to a very small number of marks.

CHAPTER LX.

Degree of Doctor of Laws (LL.D.)

Eligibility of candidates to apply.

1. A Master of Laws of the University of Madras may offer himself as a candidate for the Degree of Doctor of Laws, provided one year has elapsed from the time when he passed the examination for the Degree of Master of Laws, and five years from the time when he passed the examination for the Degree of Bachelor of Laws.

Application and thesis.

2. Every candidate shall state in his application the special subject falling within the purview of the Faculty of Law, upon a knowledge of which he rests his qualification for the Doctorate, and shall, with the application, transmit four copies, printed or type-written, of a *thesis that he has composed upon some branch of Law or of the history or philosophy of Law.

The candidate shall indicate generally in a preface to his thesis and especially in notes, the sources from which his information is taken, the extent to which he has availed himself of the work of others and the portions of the thesis which he claims as original ; he shall further state whether his research has been conducted independently, under advice, or in co-operation with others, and in what respects his investigations appear to him to advance the study of Law.

The thesis shall be accompanied by a declaration signed by the candidate that it has been composed by himself and a certificate that the thesis has not previously formed the basis for the award of any Degree, Diploma, Associateship, Fellowship or other similar title.

Original contributions to Science or study of Law.

3. Every candidate may also forward with his thesis four printed copies of any original contribution or contributions to the advancement of the science or study of Law whether published conjointly or independently, upon which he relies in support of his candidature.

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* *Note.*—A thesis must be on one main theme, and no candidate can submit as a thesis a series of unconnected papers. A series of connected papers can be submitted provided they form one connected theme, and additional papers can be submitted in support of the main thesis only on the understanding that the candidate indicates in the preface the main work, or memoir, or thesis upon which he bases his application.

CHAPTER LXII.

Degree of Master of Science (M.Sc.).

(Common to the Faculties of Medicine and Veterinary Science).

Eligibility.

1. (*a*) *Faculty of Medicine*—A Bachelor of Medicine or a Bachelor of Science in Pharmacy of this University, or of any other University recognised by the Syndicate as equivalent thereto, can present himself for the Degree of Master of Science; provided he has previous to registration for the Degree worked in the Department concerned for a period of not less than one year, and has prosecuted a course of study and research in the Department for a period of not less than one year subsequent to registration.

(*b*) *Faculty of Veterinary Science*—A Bachelor of Veterinary Science of this University, or of any other University recognised by the Syndicate as equivalent thereto, can present himself for the Degree of Master of Science; provided he has previous to registration for the Degree worked in the Department concerned for a poriod of not less than one year, and has prosecuted a course of study and research in the Department for a period of not less than one year subsequent to registration:

provided that it shall be competent for the Syndicate to dispense with a strict compliance with the above Regulation in very special cases:

provided further that graduates of other Universities shall not be eligible to submit theses for the Degree, unless they have resided for two years, subsequent to registration, within the University limits or area and have pursued a course of study in the Department concerned of a Constituent or Affiliated College or Research Institute thereof recognised by the Syndicate for this purpose during this period.

Subjects.

2. The Degree of Master of Science in the Faculties of Medicine and Veterinary Science shall be confined to the following subjects :—

Medicine.	*Veterinary Science.*
Anatomy,	Anatomy.
Physiology,	Physiology,
Pharmacology,	Pathology,
Pathology,	Parasitology,
Bacteriology,	Bacteriology,
Biochemistry, and	Animal Nutrition, and
Pharmacy.	Animal Genetics.

Registration.

3. A candidate for the Degree shall apply to the Registrar in the prescribed form together with the fee* laid down so as to reach the Registrar on any day in the month of January or August each year, giving the following particulars :—

(*a*) his qualifications and attainments and previous study ;

(*b*) the special subject which he proposes to offer for the Degree ;

(*c*) the Institution in which he proposes to prosecute his studies ; together with the written consent of the Teacher agreeing to supervise his work and to provide the necessary facilities for study, and the consent of the Head of the Institution permitting him to work in the Department.

4. Every application shall be considered by the Syndicate, and, if approved, the candidate shall be registered as a candidate for the Degree.

Approval of Institutions.

5. The Institutions for purposes of approval for study for the M.Sc. Degree shall ordinarily be Departments of the University, or Colleges affiliated to or recognised by the University in the respective Faculties. The Syndicate may recognise All-India Institutes, in regard to subjects for which facilities are not available within the University.

* The fee prescribed for registration for the M.Sc. Degree is Rs. 50.

Thesis and Examination.

6. (1) The candidate shall present a thesis embodying the results of his research and submit to an examination in the subject concerned.

(2) The examination for the Degree shall consist of a written part and a practical and *viva voce* examination. The written examination will consist of two papers on the main subject of study, and the practical and *viva voce* examination will be decided in each case on the nature of the subject offered for the Degree.

(3) The Degree shall be awarded if the thesis is approved and the candidate satisfies the examiners in the examination conducted.

A candidate who fails in one of the parts, the thesis or examination, shall be required to appear again for that part only.

Date of application.

7. The application for the Degree must be forwarded in the prescribed form so as to reach the Registrar on any day in the month of January or August and after completion of the period of study in accordance with the conditions laid down in Regulation 3 *supra.**

Valuation and result.

8. The examination shall be conducted in the month of April or December by a Board of Examiners appointed by the Syndicate. The candidate shall be declared to have qualified for the Degree, if the thesis is approved and if in the opinion of the Examining Board the candidate has shown sufficient proficiency in the subject to merit the award of the Degree. A list of successful candidates with the special subjects offered shall be published in the *Fort St. George Gazette.*

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* The fee prescribed for applying for the M.Sc. Degree is Rs. 150.

CHAPTER LXIII.

Degree of Doctor Medicine (M.D.).

Conditions of admission.

1. No candidate shall be admitted to the examination for the Degree of Doctor of Medicine unless he produces satisfactory evidence to the effect that—

(i) he, having passed the M.B. & B.S. Degree Examination of this University, has been engaged for five years continuously in the active practice of Medicine in the case of candidates for Branch I;

or

(ii) he, after qualifying for the M.B. & B.S. Degree of this University, has been (*a*) a House Surgeon in a teaching hospital recognized by or affiliated to the University, or in a District Headquarters Hospital or other hospital approved specially by the Syndicate for the purpose, for a period of 12 months, of which six months at least has been spent in the medical wards; *or* (*b*) been in the active practice of the profession for a period of three years,

and has held for a period of not less than two academic years an appointment on the medical side or in the special department concerned, as House Physician, Clinical Assistant or any similar appointment in a teaching hospital or institute affiliated to or recognized by this University;

provided, however, that in the case of a M.B. & B.S. graduate of this University who has been working for not less than one academic year in a special institute or department approved for the purpose but not affiliated to or recognized by the University, the period of attachment to the special department in a teaching hospital or institute affiliated to or recognized by this University may be reduced to one academic year.

Note.—The course of instruction in the Specialities, Branch III-A and Branch III-B, shall be four terms for the Main Subject and two terms for the Subsidiary Subject.

2. Candidates who have received the M.B. & B.S. Degree of a University other than that of Madras, recognized by the Medical Council of India, shall be permitted to appear for the M.D. Degree Examination provided that—

Conditions re: other University medical graduates.

(*a*) the Degree has been accepted by the Syndicate as equivalent to the M.B. & B.S. Degree of this University;

(*b*) they have qualified for the M.B. & B.S. Degree five years prior to their admission to the M.D. Degree course and produce satisfactory evidence of having been engaged continuously in the active practice of Medicine;

(*c*) they complete a course of one academic year at least in an institution or institutions affiliated to this University in the case of candidates applying for Branch I;

(*d*) they complete a course of not less than two academic years in the Special Department or Departments concerned in an institution or institutions affiliated to this University in the case of candidates applying for a speciality; and

(*e*) reciprocal recognition is given by the University concerned.

Branches and scheme of Examination.

3. Candidates shall be examined in one of the following Branches:—

Branch I—Medicine.

(i) Medicine including Pathology and Mental Diseases ...	2 Papers.
(ii) Tropical Medicine ...	1 Paper.
(iii) A clinical and oral examination including an examination of pathological specimens ...	

Branch II—Midwifery including Diseases of Women and Children.

(i) Medicine ...	1 Paper.
(ii) Midwifery and Diseases of women and children, including the pathology of these subjects ...	2 Papers.

(iii) An essay on one of two set subjects in Midwifery and Diseases of Women ... 1 Paper.

(iv) A clinical and oral examination in Midwifery and Diseases of women and children including an examination of pathological specimens ...

Branch III-A—Pathology (Main) and Bacteriology (Subsidiary).

(i) Medicine ... 1 Paper.

(ii) Pathology ... 2 Papers.

(iii) Bacteriology ... 1 Paper.

(iv) A practical and oral examination in advanced Pathology ...

(v) A practical examination in Bacteriology ...

Branch III-B—Bacteriology (Main) and Pathology (Subsidiary.)

(i) Medicine ... 1 Paper.

(ii) Bacteriology ... 2 Papers.

(iii) Pathology ... 1 Paper.

(iv) A practical and oral examination in advanced Bacteriology ...

(v) A practical examination in Pathology ...

The Medicine paper for candidates in Branches II, III-A and III-B shall be a common paper.

(NOTE: *Each paper shall be of three hours' duration*).

Submission of case records, thesis, etc.

4. (i) A. (*a*) Each candidate appearing for Branch I shall produce certified case records, with commentaries, of twenty cases personally in his charge, or may submit a thesis on any particular subject of study illustrating it with case records or published work.

(*b*) Each candidate for Branch II shall produce a certified record showing that he has personally operated on twenty cases of labour and operated or assisted at twenty major operations on Gynaecological cases.

(*c*) Each candidate for Branch III shall produce a certified record, with commentaries, of twenty autopsy cases personally conducted or assisted at for Branch III-A, and ten for Branch III-B:

or

B. Each candidate shall present a consolidated report on twenty cases on a chosen topic with a critical evaluation. The report should have been approved and countersigned by a recognized teacher in the subject concerned.

(ii) Candidates shall submit to the Registrar with their applications for the examination, two copies of the case records of the cases personally attended as stated above or autopsies performed or the thesis or published work embodying the results of independent research and having a definite relation to the subjects of Medicine, Pathology, etc., or the consolidated report of the cases on the chosen topic.

(iii) Such case records or thesis or published work or consolidated report shall be scrutinized by the Examiners appointed to conduct the examinations, and shall be taken into consideration in the final valuation.

Approved candidates.

5. Candidates shall be approved by the Examiners and shall be declared to have passed if they have shown an adequate knowledge in all the subjects of the examination. All the other candidates shall be deemed to have failed in the examination.

Candidates may qualify in another Branch.

6. A candidate who has already passed the examination in one Branch may appear on a subsequent occasion in another Branch; but no candidate shall be permitted to appear for the examination in two Branches in the same year. Such candidates shall comply with the conditions laid down for entrance to the examination in the Branch concerned. They shall be exempted from that part of the examination which is common to the Branch in which the candidate has already qualified and the Branch which he proposes to offer.

CHAPTER LXIV.

Degree of Master of Surgery (M.S.).

Conditions of admission.

1. No candidate shall be admitted to the examination for the Degree of Master of Surgery unless he produces satisfactory evidence to the effect that—

(i) he, having passed the M.B. & B.S. Degree Examination of this University, has been engaged for five years continuously in the active practice of Surgery in the surgical wards of a teaching hospital recognized by or affiliated to the University, or in a District Headquarters Hospital or other hospital approved specially by the Syndicate for the purpose, in the case of Branch I, General Surgery;

or

(ii) he, after qualifying for the M.B. & B.S. Degree of this University, has been (*a*) a House Surgeon in a teaching hospital recognized by or affiliated to the University, or in a District Headquarters Hospital or other hospital approved specially by the Syndicate for the purpose, for a period of twelve months, of which six months has been spent in the surgical wards, or (*b*) been engaged in active practice of the profession for a period of not less than three years,

and has held for a period of not less than two academic years an appointment on the surgical side or in the special department concerned, as House Surgeon, or Clinical Assistant or any similar appointment in a teaching hospital or institution affiliated to or recognized by the University:

provided, however, that in the case of a M.B. & B.S. graduate of this University, who has been working for not less than one academic year in a special institute or department approved for the purpose, but not affiliated to or recognized by the University, the period of attachment to the special department in a teaching hospital affiliated to or

recognized by the University may be reduced to one academic year.

Conditions re: other University medical graduates.

2. Candidates who have received the M.B. & B.S. Degree of a University other than that of Madras and recognised by the Medical Council of India shall be permitted to appear for the M.S. Degree Examination provided that—

(*a*) the Degree has been accepted by the Syndicate as equivalent to the M.B. & B.S. Degree of this University ;

(*b*) they have qualified for the M.B. & B.S. Degree five years prior to their admission to the M.S. Degree course and produce satisfactory evidence of having been engaged continuously in the active practice of Surgery ;

(*c*) they complete a course of one academic year at least in an institution or institutions affiliated to this University in the case of candidates applying for Branch I—General Surgery ;

(*d*) they complete a course of not less than two academic years in the Special Department or Departments concerned in an institution or institutions affiliated to this University in the case of candidates applying for a speciality ; and

(*e*) reciprocal recognition is given by the University concerned.

Branches and Scheme of Examination.

3. Candidates shall be examined in one of the following Branches :—

Branch I—General Surgery.

(i) Surgery .. ... 2 Papers.

(ii) Surgical Pathology and Anatomy ... 1 Paper.

(iii) Clinical examination.

(iv) Operative Surgery and the use of instruments.

(v) Oral examination including slides, pathological specimens, X-Ray plates, etc.

Branch II—Special Subjects.

Candidates may offer any one of the following special subjects :—

(*a*) Oto-Rhino-Laryngology.

(*b*) Ophthalmology.

(*c*) Orthopaedics.

Candidates offering any of these special subjects shall be examined in—

(i) Surgery (which shall be common for all candidates appearing in the special subjects) ... 1 Paper.

(ii) Special subject, which shall include Anatomy and Surgical Pathology of the speciality ... 2 Papers.

(iii) A clinical examination in General Surgery.

(iv) A clinical examination in the special subjects.

(v) Practical and Oral examination in the special subject, including an examination of pathological specimens, slides, X-Rays, use of special instruments and operations.

(NOTE : *Each paper shall be of three hours' duration*).

Submission of case records, thesis, etc.

4. (i) A. Each candidate shall produce certified records of twenty cases personally studied or a thesis in the particular subject or published work and a list of twenty major operations personally conducted or assisted at by him, duly attested :

or

B. Each candidate shall present a consolidated report on twenty cases on a chosen topic with a critical evaluation. The report should have been approved and countersigned by a recognized teacher in the subject concerned.

(ii) Candidates shall transmit to the Registrar with their applications for the examination, two copies of case records of twenty cases personally conducted or assisted at, or the thesis or published work, or the consolidated report of the cases on the chosen topic.

(iii) Such case records or thesis or published work or consolidated report shall be scrutinized by the Examiners appointed to conduct the examinations, and shall be taken into consideration in the final valuation.

Approved candidates.

5. Candidates shall be approved by the Examiners and shall be declared to have passed if they have shown an adequate knowledge in all the subjects of the examination. All the other candidates shall be deemed to have failed in the examination.

Candidates may qualify in another Branch.

6. A candidate who has already passed the examination in one Branch may appear on a subsequent occasion in another Branch; but no candidate shall be permitted to appear for the examination in two Branches in the same year. Such candidates shall comply with the conditions laid down for entrance to the examination. They shall be exempted from that part of the examination which is common to the Branch in which the candidate has already qualified and the Branch which he proposes to offer.

CHAPTER LXV.

Post-Graduate Diplomas in Medicine and Surgery.

Conditions of admission.

1. Candidates for the Diploma in any of the following subjects shall be required to have passed the M.B. & B.S. Degree Examination of this University or an examination accepted by the Syndicate as equivalent thereto :—

1. Diploma in Gynaecology and Obstetrics.
2. Diploma in Venereology.
3. Diploma in Dermatology.
4. Diploma in Ophthalmology.
5. Diploma in Oto-Rhino-Laryngology.
6. Diploma in Radiology.
7. Diploma in Orthopaedics.
8. Diploma in Tuberculosis.

No candidate shall be eligible to appear for any of the above Diplomas unless he has, subsequent to passing the M.B. & B.S. Degree Examination, held a House *appointment* for a period of one year in a recognized hospital attached to a teaching institution of this University or of any other University accepted as equivalent thereto, or in a District Headquarters Hospital or other hospital approved specially by the Syndicate for the purpose or produced evidence of having been in active practice of the profession for three years subsequent to passing the M.B. & B.S. Degree Examination. Candidates should thereafter have attended for a period of twelve months the practice of a special hospital or the special wards of a general hospital dealing with the particular speciality and affiliated to or recognized by this University, during which period they should have attended not less than 20 lecture demonstrations in the particular speciality; no candidate who fails to produce evidence of having satisfied these conditions shall be admitted to the examination.

Registration of candidates and period of House-Surgeoncy.

2. Every candidate who wishes to appear for the Diploma shall be required to register his name with the University at the commencement of the academic course. Candidates for the Diplomas in Ophthalmology, Oto-Rhino-Laryngology, Radiology and Orthopaedics must have completed at least six months' house-surgeoncy on the surgical

side, while candidates for the Diplomas in Obstetrics and Gynaecology, Dermatology and Venereology must have completed at least six months' house-surgeoncy on the medical side, and candidates for the Diploma in Tuberculosis must have completed at least six months' House-Surgeoncy on the Medical side and six months' House-Surgeoncy on the Surgical side.

Exemptions.

3. Candidates who have attended the practice of the speciality in an institution affiliated to a recognised teaching hospital of this University for over six months may claim exemption for a period not exceeding six months of the course for the particular Diploma. In the case of the Diploma in Gynaecology and Obstetrics, practice at the Government Victoria Caste and Gosha Hospital, Triplicane, may be recognised for a period of six months. It shall be open to the Syndicate, in exceptional cases, where sufficient evidence of the practice of the speciality is produced, to exempt the candidates for a period of the course which shall under no circumstances exceed six months.

(*Note* :—Institutions which are desirous of recognition must apply to the University for such recognition.)

Every candidate for a Diploma shall be required to register his name with the University not later than six months before the commencement of the examination, shall attend the prescribed course of clinical lectures and demonstrations and shall pay to the University such fees as may be prescribed.

Examination and other Fees.

The fee payable for the examination shall be Rs. 75. A candidate who fails in the examination can be admitted at the succeeding examination provided he attends an additional course of one term or three months in accordance with the conditions as may be prescribed by the Surgeon-General with the Government of Madras, and also pays the fee prescribed by the University.

Dates of Examinations.

4. The examination for the Diplomas shall be held twice a year in the months of April and October, except in the case of the Diploma in Tuberculosis, which shall be in January and July.

5. Courses of study and scheme of examination.

(i) Diploma in Gynaecology and Obstetrics.

(1) Every candidate shall be required—

(a) to have served as a House Surgeon in a recognised lying-in-hospital for a period of six months ;

(b) to have personally conducted at least six Obstetric Operations under the supervision of the Medical Staff of a recognised institution during this period ; and

(c) to have subsequently given regular attendance for a period of six months at the Government Hospital for Women and Children, Madras, and to have attended such lectures and clinical demonstrations as may be prescribed.

Course of Study.

The course shall cover theoretical and clinical instruction of not less than 30 clinical lecture demonstrations on Obstetrics and Gynaecology during this period, and in particular the instruction and examination shall embrace the following :—

Practice of Obstetrics,
Practice of Gynaecology,
Anatomy of the Female Pelvis,
Elementary Embryology,
Pathology of the Female Organs, and
Ante-Natal Pathology.

(2) At the end of the course, candidates shall be examined in the following papers and clinical :—

1. Obstetrics—One paper—3 hours—100 Marks.
2. Gynaecology and Diseases of a new born child—One paper—3 hours—100 Marks.
3. A clinical and oral examination in Obstetrics and Gynaecology—100 Marks.

Scheme of Examination.

The examination which will be very largely practical is intended to test the student's knowledge of the practical side of Obstetrics and Gynaecology.

(3) Candidates obtaining not less than one-half of the marks in each of the papers and one-half in the clinical and *viva voce* shall be declared to have passed the examination. All the other candidates shall be deemed to have failed.

Marks qualifying for a pass.

(ii) Diploma in Venereology.

(1) The course of study for the Diploma shall extend over a period of twelve months, and shall be conducted in the Venereal Department of a general or special hospital affiliated to the University for the purpose, during which period the candidate shall be required also to undergo training for two weeks in serology and for one month in dermatology.

Course of Study.

The course of study shall consist of not less than twenty lecture demonstrations and instruction in laboratory technique and public health aspect of venereal diseases.

(2) At the end of the course candidates shall be examined in the following :—

Scheme of Examination.

1. A written paper—3 hours 100 Marks.
2. A clinical examination 100 Marks.
3. Oral examination 50 Marks.

(3) Each candidate shall be required to show evidence of having done 20 minor operations, of having given 100 injections, of having done 50 D.G.I. tests and of having examined 100 smears and generally to have duly performed the work of the course.

Marks qualifying for a pass.

(4) Candidates obtaining not less than one-half of the marks in the written paper and one-half in the clinical and *viva voce* shall be declared to have passed the examination. All the other candidates shall be deemed to have failed.

(iii) Diploma in Dermatology.

Course of Study.

(1) The course of study for the Diploma shall extend over a period of twelve months and shall be conducted in the Dermatological Department of a general hospital or special hospital recognised by the University for the purpose.

The course shall cover both theoretical and practical instruction of not less than 20 lecture demonstrations on the anatomy and physiology of the skin and on the diseases thereof.

During this period, the candidate shall be required to attend the Venereal Departments of a general hospital recognised by the University for the purpose, during a period of two months, and put in such attendance at a Leprosy clinic and in an infectional diseases hospital as the lecturer in charge of the Department may consider necessary.

He shall also be required to attend a course of therapeutic radiology as applied to skin diseases in an institute recognised for the purpose for a period of not less than 3 months (12 hours in all), for one hour in a week.

Scheme of Examination.

(2) At the end of the course, the candidate shall be examined in the following :—

1.	A written paper—3 hours	...	100 Marks.
2.	A clinical examination	...	100 Marks.
3.	Oral examination	...	50 Marks.

Marks qualifying for a pass.

(3) Candidates obtaining not less than one-half of the marks in the written paper and one-half in the clinical and *viva voce* shall be declared to have passed the examination. All the other candidates shall be deemed to have failed.

(*iv*) *Diploma in Ophthalmology.*

Course of Study.

(1) The course of study for the Diploma shall extend over a period of 12 months, and it shall be obligatory on every candidate to produce evidence of having served as a House Surgeon in an Ophthalmic Hospital or the Ophthalmic Wards of a General Hospital attached to a teaching institution for a period of six months. He shall thereafter have received practical instruction at the Government Ophthalmic Hospital, Madras, for another six months, or in the alternative, shall have received practical instruction at the Government Ophthalmic Hospital, Madras, for a period of 12 months.

Detailed Course of Study.

(2) During the period of six months' attendance at the Government Ophthalmic Hospital, Madras, candidates shall be required to attend such lectures and demonstrations as may be prescribed from time to time. The course of study shall consist of not less than 30 clinical

lecture demonstrations and in particular the instruction and examination shall embrace the following :—

(*a*) Anatomy including Embryology and Physiology of the eye and vision.

(*b*) General diseases of the eye, their diagnosis and treatment.

(*c*) Errors of refraction including visual optics and perimetry.

(*d*) Ophthalmoscopy.

(*e*) Pathology and Bacteriology of the eye.

(*f*) Ophthalmic Surgery.

(*g*) Ophthalmology in its relation to general medicine.

Scheme of Examination.

(3) At the end of the course the candidate shall be examined in the following :—

Written Examination.

I Paper—Part I : Anatomy and Physiology of the Eye and Optics.

Part II : Bacteriology and Pathology of the Eye.

II Paper : Ophthalmic Medicine and Surgery including Ophthalmology in its relation to general medicine.

Each of these papers shall be of three hours' duration and shall carry 100 marks.

Practical, Clinical and Oral Examinations.

(*a*) Clinical examination	...	100 Marks.
(*b*) Refraction and Dark Room examination	...	100 Marks.
(*c*) Pathological specimens, microscopic slides, optical instruments and appliances	...	50 Marks.
Viva Voce	...	50 Marks.

Marks qualifying for a pass.

(4) Candidates obtaining not less than one-half of the marks in the First Paper and in Pathological specimens, etc., one-half of the marks in the Second Paper in Ophthalmic Medicine and Surgery and the *viva voce* examination, and one-half of the marks in the Clinical, Refraction and Dark Room examinations shall be declared to have passed the examination. All the other candidates shall be deemed to have failed.

(*v*) *Diploma in Oto-Rhino-Laryngology.*

Course of Study.

(1) The course of study for the Diploma shall extend over a period of twelve months and shall be conducted in the Ear, Nose and Throat Department of a General Hospital or special hospital affiliated to the University for the purpose, during which period the candidate shall have attended such lectures and demonstrations as may be prescribed from time to time. The course of study shall consist of not less than 20 lecture demonstrations, and in particular the instruction and examination shall embrace the following :—

Part I : The anatomy, embryology and physiology of the ear, nose, pharynx, larynx, trachea, bronchi and oesophagus. Students should have also a fair knowledge of Acoustics.

Part II : Medicine, surgery and pathology of the above *i.e.* ear, nose, pharynx, etc.

Scheme of Examination.

(2) The examination shall consist of a written paper, an oral and a practical under Part I, and a written paper, an oral, a practical and a clinical under Part II, and shall be as follows :—

Part I—Written paper—3 Hours	...	100 Marks.
Practical and Oral	...	50 Marks.
Part II—Written paper (Diseases and treatment of the Ear, Nose and Throat)—3 Hours	...	100 Marks.

Clinical ... 100 Marks.

Practical and oral including slides, pathological specimens, instruments and operations ... 50 Marks.

Examination in parts.

(3) Part I of the examination may be taken at the end of six months after the commencement of the course, but no candidate shall be declared to have passed Part II unless he has passed Part I of the examination.

Marks qualifying for a pass.

(4) Candidates obtaining not less than one-half of the marks in the written paper and one-half of the marks in the practical and *viva voce* in Part I shall be declared to have passed Part I, and those who obtain one-half of the marks in the written paper and one-half of the marks in the clinical, practical, *viva voce*, etc., in Part II shall be declared to have passed the examination. All the other candidates shall be deemed to have failed.

(*vi*) *Diploma in Radiology.*

(1) The course of study for the Diploma shall extend over a period of twelve months and shall be conducted in a Radiological Department recognised by the University for the purpose.

Course of Study.

The course shall cover both theoretical and practical instruction in the following :—

Anatomy and Histology with special reference to Radiology, Pathology with special reference to Radiology concerning tumours, injury to bones and joints, thorax, Radiological Diagnosis, Radiographic and Radiation therapy apparatus, Radium therapy, various forms of light and heat treatment, Electrology, Hydrotherapy and Vibration therapy.

Scheme of Examination.

(2) The examination shall consist of two parts :—

Part I—Physics and minor electrical engineering—2 Papers—3 hours each ... 100 Marks each.

Part II—Radiology—Written—Diagnostic Radiology—3 hours ...	100 Marks.
Therapeutic Radiology—3 hours. ...	100 Marks.
Practical and Oral ...	100 Marks.

Examination in parts.

(3) Part I of the examination may be taken at the end of six months after the commencement of the course, but no candidate shall be declared to have passed Part II unless he has passed Part I of the examination.

Marks qualifying for a pass.

(4) Candidates obtaining not less than one-half of the marks in each of the written papers of Part I shall be declared to have passed Part I, and those who obtain one-half of the marks in each of the written papers and one-half in the practical and *viva voce* in Part II shall be declared to have passed the examination. All the other candidates shall be deemed to have failed.

(*vii*) *Diploma in Orthopaedics.*

(1) The course of study for the Diploma shall extend over a period of 12 months and shall be conducted in an Orthopaedic Department (both in-patients and out-patients) attached to a hospital recognised by the University for the purpose.

Course of Study.

The course shall cover both theoretical and practical instruction in the following :—

(*a*) Study of fractures and dislocations.

(*b*) Study of deformities of limbs, both congenital and acquired.

(*c*) Study of tuberculous conditions of bones and joints.

(*d*) Study of all other diseases of bone.

(*e*) Study of physio-therapy.

(*f*) Study of the history of the cripple problem and its application in India.

(*g*) Orthopaedic operations.

Scheme of Examination.

(2) The examination shall consist of a written paper, a practical, a clinical and an oral and shall be as follows :—

Written examination—

2 Papers of 3 hours each	...	100 Marks each.
Clinical and practical	...	150 Marks.
Oral examination with pathological specimens, microscopic work, X-Rays, splints, etc.	...	50 Marks.

Marks qualifying for a pass.

(3) Candidates obtaining not less than one-half of the marks in each of the written papers including *viva voce* and not less than one-half in the practical and clinical examinations shall be declared to have passed the examination. All the other candidates shall be deemed to have failed.

(viii) Diploma in Tuberculosis.

Course of Study.

(1) The course of study for the Diploma shall extend over a period of twelve months and shall be conducted in an institution or institutions recognized by the University. The period of training may be partly in a Medical College and partly in a special institution, but at least six months of such training shall be spent in an institution attached to a Medical College affiliated to or recognized by the University.

Scheme of Examination.

(2) At the end of the course, candidates shall be examined in the following :—

	Hours.	Marks.
Written Examination—Paper I : Pulmonary Tuberculosis including preventive aspect ...	3	100
Written Examination—Paper II : Non-Pulmonary Tuberculosis including Special Tuberculosis ...	3	100
Practical, Clinical and Oral Examinations :		
Clinical Examination in the subjects covered by Paper I ...	...	100

	Hours.	Marks.
Clinical Examination in the subjects covered by Paper II	...	100
Pathological specimens, microscopic slides, etc. (Practical)	...	50
Viva voce ...	...	50
Total	...	500

Marks qualifying for a pass.

(3) Candidates obtaining not less than one-half of the marks in (*a*) the two written papers, (*b*) the clinical examination, and (*c*) the practical and *viva voce* examination, shall be declared to have passed the examination. All the other candidates shall be deemed to have failed in the examination.

CHAPTER LXVI.

Degree of Bachelor of Sanitary Science (B.S.Sc.).

Condition of admission.

1. Candidates for this Degree must be graduates in Medicine and Surgery of the University of Madras or hold corresponding degrees of other Universities or Licensing Bodies recognised for the purpose by the University. The degree must be registered with the Madras Medical Council before a candidate is admitted to the examination.

Course of Study.

2. The course of study shall extend over a period of not less than twelve calendar months, and shall include instruction in the subjects as hereunder :—

A.—Part I.

(i) Bacteriolsgy (including 180 hours of practical work) extending over a period of ... ... 220 hours.

(ii) Entomology and Parasitology (including 70 hours of practical work in the laboratory and in the field, and Malaria surveys) extending over a period of ... ... 90 hours.

(iii) Chemistry and Physics in relation to Public Health (including 180 hours of practical work) extending over a period of ... ... 180 hours.

(iv) Climatology and Meteorology extending over a period of ... ... 10 hours.

B.—Part II.

(i) The Principles and Practice of Public Health (including 10 hours' instruction in Maternity and Child Welfare work and organisation) extending over a period of ... 50 hours.

(ii) Epidemiology and Vital Statistics extending over a period of ... 20 hours.

(iii) Sanitary Law and Administration extending over a period of ... 20 hours.

(iv) Sanitary Construction and Planning (including 10 hours instruction in Town Planning and Civic Surveys) extending over a period of ... 30 hours.

(v) The Theory and Practice of Vaccination (including practical and outdoor work, detection and verification) extending over a period of ... 30 hours.

(vi) Instruction in Infectious Diseases and attendance upon the clinical practice of an Infectious Diseases Hospital extending over a period of three months, and comprising 30 attendances of two hours each on three days a week, involving a total period of ... ... 60 hours.

Note.—Provision for such instruction is made in the Infectious Diseases Hospitals in Madras.

(vii) Instruction in Public Health Administration (including the practical routine and special work of a Medical Officer of Health) extending over a period of six months, and comprising 60 attendances of three hours each under a Medical Officer of Health, involving a total period of ... ... 180 hours.

Note.—This course shall comprise instruction in Maternity and Child Welfare Work, the Medical Inspection of School Children, Industrial Hygiene, Inspection and control of foods and drugs.

(viii) Instruction in Tuberculosis, clinical and administrative, extending over a period of ... ... 30 hours.

(ix) Instruction in Venereal Diseases, clinical and administrative, extending over a period of ... 10 hours.

Note.—Provision is made in the Medical College, Madras, in the City of Madras, and in the Public Health Department for instruction in the subjects set out above.

Academic Terms.

3. The course of study shall commence in July, and shall extend over four terms as follows:—The Autumn term from July to the end of September; the Winter term from October to December; the Spring term from January to March; the Summer or Vacation term from April to June. The course of study shall be taken in the Medical College, Madras, or in the appropriate institutions in Madras recognised for the purpose by the University.

Divisions of Examination.

4. The examination for the degree shall be conducted in two Parts and shall be held twice a year: Part I beginning on the 15th January or the 15th April respectively, and Part II beginning on the 15th July or the 20th November respectiveiy.

5. To obtain a pass in each Part the candidates must pass in all the subjects specified in that Part at the same sitting.

Conditions of eligibility for appearing at the Examination.

6. (a) No candidate shall be admitted to the examination unless he has taken the degree in Medicine and Surgery in this University or a Degree in some other University or obtained a Diploma of a Licensing Body recognised by the University as equivalent thereto and has been registered by the Madras Medical Council.

(b) A candidate for the examination shall further be required to produce with his application satisfactory evidence of his having taken a Medical Degree or obtained the Diploma specified in the preceding Regulation and of his having been registered by the Madras Medical Council.

(c) A candidate shall further produce the required attendance and progress certificates for each Part.

(d) No candidate shall be admitted to Part II of the Examination unless he has passed previously Part I of the Examination, and two years had elapsed after qualifying for the Medical Degree or obtaining the Diploma.

Term certificate.

7. Candidates shall not be deemed to have attended a course of instruction for the purpose of this degree who do not present certificates showing not only that they have regularly attended the course, but also that they have duly performed the work thereof to the satisfaction of the Professor or Lecturer in the subject concerned.

8. Candidates shall be examined in the following subjects in Part I of the examination.

Subjects for Examination—Part I.

(i) Chemistry and Physics in relation to Public Health, Climatology and Meteorology.

(ii) Bacteriology.

(iii) Medical Entomology and Parasitology.

The examination in each subject shall include a written paper, practical examination and a *viva voce*.

Marks qualifying for a pass in Part I.

9. Candidates who obtain not less than one-half of the aggregate marks in each subject in Part I of the examination shall be declared to have passed.

10. Candidates shall be examined in the following subjects in Part II of the examination:—

Subjects for Examination—Part II.

(i) Hygiene and Preventive Medicine and Public Health including Sanitary Engineering.

(ii) Epidemiology and Infectious Diseases.

(iii) Sanitary Law and Vital Statistics.

(iv) Public Health Administration.

The examination in subjects (i) and (iii) shall include a written paper and a *viva voce*; that in (ii) shall include a written paper, a practical examination and a *viva voce*, and that in (iv) shall consist of a practical examination only.

Marks qualifying for a pass in Part II.

11. Candidates who obtain not less than one-half of the aggregate marks in each subject in Part II of the examination shall be declared to have passed.

Marks qualifying for a pass for the whole Examination, and classification of successful candidates.

12. Candidates who pass both parts of the examination at the first sitting and who obtain not less than two-thirds of the aggregate marks of both the parts together shall be declared to have passed in the First Class; and candidates obtaining not less than seventy-five per cent of the marks in any subject shall be declared to have passed with distinction in that subject. Candidates obtaining less than two-thirds of the aggregate marks and not less than 50 per cent of the total marks shall be declared to have passed the examination in the Second Class. All the other candidates shall be deemed to have failed in the examination.

TIME-TABLE OF THE COURSES FOR
THE B.S.Sc. DEGREE (MEDICAL COLLEGE).

I.—Autumn term (July to September.)

8—10 ...	Medical Entomology and Parasitology—Daily ...	90 hours.
12—1 ...	Bacteriology Lectures—Daily except Friday ...	40 hours.
	Climatology and Meteorology —Friday ...	10 hours.
1—5 ...	Bacteriology Laboratory work—Daily ...	180 hours.

II.—Winter term (October to December.)

7—9 ...	Vaccination—Daily in October...	30 hours.
	Tuberculosis—Daily for three weeks in November ...	30 hours.
	Venereal Diseases—Daily for one week in November ...	10 hours.
	Maternity and Child Welfare and Propaganda—Daily for two weeks in December ...	10 hours.
	Town Planning—Daily for two weeks in December ...	10 hours.

11—12	...	Principles of Public Health—Daily ...	40 hours.
12—4	...	Public Health Chemistry Laboratory work—Daily ...	180 hours.

III.—Spring term (January to March.)

7—10	...	Duties of the Medical Officer of Health and out-door demonstrations—Monday, Wednesday, Friday ...	90 hours.
		Infectious Diseases Hospital—Tuesday, Thursday, Saturday.	60 hours.
3—4	...	Epidemiology and Vital Statistics—Daily in January from the second Monday ...	20 hours.
		Sanitary Law and Administration—Daily in February from the second Monday ...	20 hours.
4—5	...	Sanitary Engineering—Daily in January from the second Monday ...	20 hours.

IV.—Summer or Vacation term (April to June.)

		Public Health Administration and Routine with a Medical Officer of Health ...	90 hours.

CHAPTER LXVII.

Degree of Bachelor of Science in Pharmacy [B.Sc. (Pharmacy)].

1. Candidates for the Degree of Bachelor of Science (Pharmacy) shall be required :—

Eligibility for the course—Age limit and preliminary qualifications.

(i) to have completed the age of 17 years on or before the date of admission to a College affiliated to or recognised by the University for the purpose of training candidates for this degree ;

(ii) to have passed the Intermediate Examination in Arts and Science of this University or an examination of some other recognised University accepted by the Syndicate as equivalent thereto, having offered as optional subjects Mathematics, Physics and Chemistry *or* Physics, Chemistry and Natural Science ;

(iii) to have subsequently studied for a period of six months (two terms) in a college affiliated to or recognised by the University the subjects of General Chemistry, Organic Chemistry, Botany and Physiology (according to the syllabuses prescribed in these subjects by the University) and to have passed the Preliminary Science Examination in Pharmacy ; and

(iv) to have, subsequent to having studied the above Preliminary Science subjects, been engaged for not less than one year and a half (four terms) in the study of Pharmaceutical Chemistry, Pharmaceutics and Practical Pharmacognosy (according to the syllabuses prescribed in these subjects by the University), in a college affiliated to or recognised by the University :

Provided that no candidate shall be allowed to appear for the Final Examination within one year of passing the Preliminary Science Examination in Pharmacy:

Provided, further, that a candidate who has failed in any subject or subjects of the Preliminary or Final Examination may be allowed to appear again only in the subject or subjects in which he has failed.

Duration of course.

2. The course for the Degree of B.Sc. (Pharmacy) shall extend over a period of two academic years or six terms. The curricula and syllabuses for the course shall be prescribed from time to time.

Examinations.

3. The examinations for the Degree shall consist of a Preliminary Examination at the end of the second term, and a Final Examination at the end of the course (second year).

B. Sc. (Pharmacy)—Preliminary.

Course of Study.

4. A candidate for this examination shall undergo a course of instruction in the following subjects extending over a period of six months (two terms) :—

(a) General Chemistry.

(b) Organic Chemistry.

(c) Botany.

(d) Physiology.

Exemption from attendance certificates.

5. Candidates who have qualified for the B.A. or B.Sc. Degree (Pass or Honours) of this University with either Chemistry or Botany as the main or subsidiary subject or of any other Indian University (where practical courses and examinations are held) accepted by the Syndicate as equivalent thereto shall not, however, be required to produce the prescribed certificates of attendance for, or to pass in, either Chemistry or Botany, as the case may be. Such candidates shall, however, be required to pay the prescribed fee for the whole examination.

6. Candidates who have qualified for the B.Sc. (Pass or Honours) Degree of this University with Chemistry and Botany or of any other Indian University (where practical courses and examinations are held) accepted by the

Syndicate as equivalent thereto shall not, however, be required to produce the prescribed certificates of attendance for, or to pass in, those subjects under B.Sc. (Pharmacy) Preliminary Examination. Such candidates shall, however, be required to pay the prescribed fee for the whole examination.

Course and Scheme of Examination.

7. The course in General Chemistry, Organic Chemistry and Botany shall consist of lectures and practical work. The course in Physiology shall consist of lectures and practical demonstrations to the students. The Preliminary Examination shall consist of written, practical and oral examinations in General Chemistry, Organic Chemistry and Botany, and written and oral examinations in Physiology, and the scheme of examination shall be as follows :—

		Hours.	*Marks.*
General Chemistry (Written)	...	2	100
Organic Chemistry (Written)	...	3	100
Botany (Written)	...	2	100
Physiology (Written)	...	2	100
General Chemistry (Practical)	...	3	100
Organic Chemistry (Practical)	...	3	100
Botany (Practical)	...	3	100
General Chemistry (Oral)	...	...	50
Organic Chemistry (Oral)	...	...	50
Botany (Oral)	...	...	50
Physiology (Oral)	...	...	50
Total	...	...	900

The Oral Examination for each candidate shall last 20 minutes.

Marks required for a pass.

8. A candidate for the examination shall be declared to have passed the examination, if he obtains not less than one-half of the marks in the practical part and not less than one-half of the marks in the written and oral parts

taken together in the case of General Chemistry, Organic Chemistry and Botany, and not less than one-half of the marks in the written and oral parts taken together in the case of Physiology.

9. A candidate who fails in the examination, but obtains passing marks in any subject shall be exempted from re-examination in that subject.

Classification of successful candidates.

10. Candidates who pass the whole examination at their first appearance shall be arranged in two classes in the order of proficiency—the first consisting of those who obtain not less than 65 per cent of the total marks and the second consisting of the others. Candidates who pass in the first class and who obtain not less than 75 per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

Candidates who complete the examination by passing at a subsequent appearance shall be ranked only in the second class.

B.Sc. (Pharmacy)—Final.

Course of Study and eligibility for admission.

11. The course for the B.Sc. (Pharmacy) Final shall extend over a period of one academic year and a half (four terms). No candidate shall be admitted to the B.Sc. (Pharmacy) Final Examination unless he has passed the B.Sc. (Pharmacy) Preliminary Examination not less than one year previous to appearing for the Final Examination and has undergone the course of instruction in the prescribed subjects, viz.,—

(a) Pharmaceutical Chemistry.

(b) Pharmaceutics.

(c) Practical Pharmacognosy.

Scheme of Examination.

12. The Final Examination shall consist of written, practical and oral examinations and the scheme of examination shall be as follows :—

	Hours.	*Marks.*
Pharmaceutical Chemistry (Written).	3	100
Pharmaceutics (Written) ...	3	100
Pharmaceutical Chemistry (Practical)— ... ... (2 days of 6 hours each).	12	200
Pharmaceutics (Practical) ...	4	100
Practical Pharmacognosy (Practical)	4	100
Pharmaceutical Chemistry (Oral)	...	50
Pharmaceutics (Oral)	...	25
Practical Pharmacognosy (Oral) ...	...	25
Total ...		700

The Oral Examination for each candidate shall last 20 minutes.

Marks required for a pass.

13. A candidate for the examination shall be declared to have passed the examination if he obtains in Pharmaceutical Chemistry and in Pharmaceutics not less than one-half of the marks in the practical part and not less than one-half of the marks in the written and oral parts taken together, and in Practical Pharmacognosy not less than one-half of the marks in the practical and oral parts taken together.

14. A candidate who fails in the examination, but obtains passing marks in any subject shall be exempted from re-examination in that subject.

Classification of successful candidates

15. Candidates who pass the whole examination at their first appearance shall be arranged in two classes in the order of proficiency—the first consisting of those who obtain 65 per cent of the total marks and the second consisting of the others. Candidates who pass in the first class and who obtain not less

than 75 per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

Candidates who complete the examination by passing subject by subject shall be placed in the second class separately.

Further study for failed candidates—Final.

16. A candidate who fails in any subject or subjects shall be required to undergo a further course of study for at least one academic term before appearing for the succeeding examination.

Submission of Laboratory note-books.

17. Candidates may be allowed, at the discretion of the Examiners, to bring to the Practical Examination in any of the subjects in the Preliminary or Final Examination any book or books they choose. The candidates shall be required to bring to the Practical Examinations their original laboratory note-books for inspection by the Examiners.

CHAPTER LXVIII

Degree of Bachelor of Science in Nursing

(B.Sc. Nursing).

1. Candidates for the Degree of B.Sc. (Nursing) shall be required to comply with each of the following conditions, *viz.*,

Preliminary Qualifications.

(i) have completed the age of seventeen years on or before the date of admission to the course;

(ii) have passed the Matriculation Examination of this University or of any other Indian University or have passed a qualifying examination of any University outside India which may be accepted by the Syndicate as equivalent thereto, or have completed the S.S.L. Certificate issued by the Government of Madras or the Indian State of Cochin or the E.S.L. Certificate issued under the orders of the Government of Madras or the Administration of Bangalore and Coorg, and been declared eligible for admission to a course of study in this University, or failing that have passed any other examination conducted by a State, Province or Statutory Board accepted by the Syndicate as equivalent to the Matriculation Examination of this University;

(iii) have been enrolled as a Nurse-Pupil and performed the routine duties of a hospital as a pupil nurse during the whole period of study in a Hospital affiliated to a Medical College and recognised for this purpose;

(iv) have undergone the prescribed course of study in a Constituent or Affiliated (Medical) College for a period of not less than two academic years (or six terms), and passed the Intermediate Examination in Science in Nursing; and

(v) have undergone a further course of study for a period of two academic years (or six terms) in a Constituent or Affiliated (Medical) College in the subjects prescribed, and passed the B.Sc. Degree Examination in Nursing.

Courses of Study and Examinations.

2. The course of study for the B. Sc. Degree in Nursing shall comprise instruction in the following subjects, according to a syllabus to be prescribed from time to time:—

Academic Subjects	*Medical Subjects*	*Nursing Subjects.*
English	Anatomy and Physiology	Nursing and Allied Arts
Physics and Chemistry	Microbiology	History of Nursing
Psychology and Sociology	Nutrition and Diet Therapy	Nursing—Medical and Surgical, Gynaecological, Children, Public Health and Advanced Nursing
World History	Pharmacology and Therapeutics Hygiene and Preventive Medicine	Community Health and Social needs; Ward Administration and Teaching; Professional Opportunities and Adjustments

I. Intermediate Examination in Science in Nursing.

3. The course shall extend over a period of two academic years, and shall consist of:—

Course of Study.

Part I—English

Part II—Chemistry and Physics
Psychology
Anatomy and Physiology
Microbiology
Nutrition and Diet Therapy

Part III—Nursing: as defined below.

The candidate shall be required to perform the routine duties of the hospital as a pupil nurse in a hospital affiliated to a Medical College and recognised for this purpose during the whole period of study; and no candidate applying for the examination at the end of the two years shall be permitted to appear therefor unless he or she produces such certificates of attendance and satisfactory progress, in the various subjects including practical nursing, as may be laid down from time to time. The examination shall consist of three parts; and a candidate appearing for the examination on the first occasion shall apply for all the parts of the examination, but may thereafter

appear for any part or parts of the examination in which he or she has not already secured passing marks at the previous examination.

Scheme of Examination.

4. The scheme of examination shall be as follows:—

Part I:

		Hours.	*Marks.*
English Composition	...	3	100
Poetry and Drama	...	3	100
Prose	...	3	100
			300

Part II:

Chemistry and Physics	...	3	100
Psychology	...	$2\frac{1}{2}$	75
Anatomy and Physiology	...	3	100
Microbiology	...	$2\frac{1}{2}$	75
Nutrition and Diet Therapy	...	3	100
			450

Part III—Nursing:

Nursing and Allied Arts	...	3	100
Medical and Surgical Nursing, Pharmacology and Therapeutics		3	100
Practical Examination	...		150
			350

Marks required for a pass.

5. A candidate shall be declared to have passed the examination if he or she obtains not less than (1) 35 per cent of the marks in Part I—English, (2) 35 per cent of the marks in each of the subjects in Part II, and 40 per cent in the aggregate; and (3) 40 per cent of the marks in each of the subjects in Part III, and 50 per cent in the aggregate.

Classification.

Candidates who pass in all the parts of the examination at one and the same sitting and obtain not less than 60 per cent of the total marks shall be placed in the First Class. Such of the candidates as obtain 75 per cent of the total marks

shall be classed as having passed in the First Class with distinction. All the other successful candidates shall be placed in the Second Class.

Candidates failing in Parts may continue their studies.

6. A candidate who fails either in Part I or in Part III or in two subjects of Part II may continue the courses of study for the next higher examination, subject to his or her passing in that part or subjects before appearing for the Final Examination for the B.Sc. Degree in Nursing; provided the failure was not less than one year prior to the date of appearing for the final qualifying examination.

II. B.Sc. Degree Examination in Nursing.

7. Candidates for the examination for the B.Sc. Degree in Nursing shall, subject to the conditions under Regulation 6 *supra*, be required to have passed the Intermediate Examination in Science in Nursing of this University and to have subsequently undergone a course of study in a Constituent or Affiliated (Medical) College for a period of not less than two academic years (or six terms), in the following subjects:—

Course of Study.

Part I—Any one of the following languages, at the option of the candidate:—

(i) English

or

(ii) Tamil
Telugu
Kannada
Malayalam
Urdu

Text-books will be prescribed from time to time in the Languages.

Part II—Hygiene and Preventive Medicine
Professional Opportunities and Adjustments
World History and History of Nursing
Sociology

Part III—Nursing: as defined below.

Every candidate shall be required to perform the routine duties of the Hospital as a pupil nurse in a hospital affiliated to a Medical College and recognised for this

purpose during the whole period of study, and shall produce such certificates of attendance and satisfactory progress in the various subjects including practical nursing, as may be prescribed from time to time. Throughout the practical course of Nursing, stress will be laid on Public Health and preventive aspects of Medicine.

Scheme of Examination.

8. The scheme of examination shall be as follows :—

	Hours.	Marks.
Part I—		
English or Indian Language ...	3	100
Part II—		
Hygiene and Preventive Medicine ...	3	100
Professional Opportunities and Adjustments ...	3	100
World History and History of Nursing ...	3	100
Sociology ...	3	100
		400
Part III—*Nursing* :		
General ...	3	100
Nursing of Children and Gynaecological Nursing	3	100
Eye, Ear, Nose and Throat ...	3	100
Practical Advanced Nursing ...		150
Records (Each student to present 2 Nursing care studies and one health teaching study) ...		150
		600

9. A candidate shall be declared to have passed Part I of the examination if he or she obtains not less than 35 per cent of the total marks in that part.

Marks required for a pass.

A candidate shall be declared to have passed Part II of the examination if he or she obtains not less than 35 per cent of the marks in each subject and 40 per cent in the aggregate.

A candidate shall be declared to have passed Part III of the examination if he or she obtains not less than 40 per cent in each of the subjects comprised in the part, and 50 per cent in the aggregate.

Classification.

Candidates obtaining not less than 60 per cent of the total marks in Part I shall be declared to have passed with distinction in the Part.

Candidates who obtain not less than 60 per cent of the total marks in Parts II and III together and who pass the examination at one and the same sitting shall be placed in the First Class, and candidates who obtain 75 per cent of the aggregate marks in both the parts, passing the parts at the first appearance, shall be declared to have passed the examination in the First Class with distinction. All the other successful candidates shall be placed in the Second Class.

Additional attendance for failed candidates.

10. Candidates who fail in any of the parts—II and III—or in the whole examination shall be required to put in an additional course of study including hospital training for a period which shall extend up to the next succeeding examination.

CHAPTER LXIX.

Degree of Bachelor of Engineering (B.E.).

Conditions of admission.

1. Candidates for the Degree of Bachelor of Engineering shall be required to have passed the Intermediate Examination in Arts and Science in this University with Physics, Chemistry and Mathematics as optional subjects or an examination in some other University accepted by the Syndicate as equivalent thereto and subsequently to have attended a Constituent or an Affiliated College for a period of not less than four academic years. They shall be further required to have passed the B.E. Degree Examinations.

Scheme of Examination.

2. The examinations for the Degree shall be both written and practical as under:—

FIRST B.E. EXAMINATION.

Part I (Written).	*Maximum Marks.*
1 Mathematics I	100
2 Physics	100
3 Chemistry	100
4 Applied Mechanics I	100
5 Civil Engineering I	100
6 Geometrical Drawing	100
Part II (Practical).	
Physics	100
Chemistry	100
Workshops	100

SECOND B.E. EXAMINATION.

Part I (Written).	
7 Mathematics II	100
8 Electrical Engineering	100
9 Mechanical Engineering	100
10 Machine Drawing and Design	100

	Maximum Marks.
11 Applied Mechanics II	100
12 Civil Engineering II	100
13 Surveying	100
or	
13 (*a*) General Textile Technology*	100
14 Building Drawing	100

Part II (Practical).

Strength of Materials	100
Surveying or Textile Technology	100
Electrical Engineering Laboratory ...	100
Workshops	100

THIRD B.E. EXAMINATION.

Civil Branch.

Part I (Written).

1 Mathematics III	100
2 Strength of Materials and Theory of Structures I	100
3 Hydraulics I	100
4 Structural Engineering I	100
5 Railway and Highway Engineering ...	100
6 Geology	100

Part II (Practical).

Strength of Materials	50
Hydraulics	50
Surveying	100
Geology	50
Workshops	50

* Common with B.Sc. (Tech.)

MECHANICAL BRANCH.

Part I (Written).

		Maximum Marks.
1	Mathematics III	100
2	Strength of Materials and Theory of Structures I	100
3	Hydraulics I	100
4	Structural Engineering I	
	or	
4	(*a*) Auto Engineering	100
15	Heat Engines I	100
16	Electrical Technology I	100

Part II (Practical).

Strength of Materials	50
Hydraulics	50
Electrical Engineering	50
Mechanical Engineering	100
Workshops	100

ELECTRICAL BRANCH.

Part I (Written).

1	Mathematics III	100
2	Strength of Materials and Theory of Structures I	100
3	Hydraulics I	100
25	Heat Engines I	100
26	Theory and Calculation of Electrical Apparatus I	100
27	Design and Drawing I	100

Part II (Practical).

Strength of Materials	50
Hydraulics	50
Electrical Engineering	100
Mechanical Engineering...	50
Workshops	50

TELE-COMMUNICATION BRANCH.

Part I (Written).

		Maximum Marks.
1	Mathematics III	100
2	Strength of Materials and Theory of Structures I	100
35	Engineering Electronics I	100
25	Heat Engines I (as for Electrical Branch) ...	100
16	Electrical Technology I (as for Mechanical Branch)	100
27	Design and Drawing I (as for Electrical Branch)	100

Part II (Practical).

Strength of Materials	50
Electrical Engineering	50
Radio Engineering	100
Mechanical Engineering	50
Workshops	50

HIGHWAY BRANCH.

Same as for Civil Branch.

AERONAUTICAL BRANCH.

Part I (Written).

1	Mathematics III	100
2	Strength of Materials and Theory of Structures I	100
3	Hydraulics I	100
50	Applied Mechanics III and Simple Theory of Flight	100
51	Airplane Structures	100
52	Aircraft Engines and Control Systems ...	100

Part II (Practical).

Strength of Materials	50
Hydraulics	50

		Maximum Marks.
	Construction of Airplane Parts ...	50
	Instruments—Testing and Calibration ...	100
	Workshops	50

AUTOMOTIVE BRANCH.

Part I (Written).

1	Mathematics III	100
2	Strength of Materials and Theory of Structures I	100
3	Hydraulics I	100
15	Heat Engines I	100
61	Automotive Engines I	100
62	Automotive Engineering Design Practice ...	100

Part II (Practical).

Strength of Materials	50
Hydraulics	50
Mechanical Engineering	50
Automotive Engineering	100
Workshops	100

TEXTILE BRANCH.

Part I (Written).

71	Textile Technology II	100
72	Preparation and Spinning I*	100
73	Preparation and Weaving I*	100
74	Fabric Structure and Designing I* ...	100
75	Industrial Organization and Economics* ...	100
76	Textile Chemistry (General)*	100

Part II (Practical).

Textile Technology	100
Spinning	50
Weaving	50
Textile Chemistry	50

* Common with B.Sc. (Tech.)

FINAL B.E. DEGREE EXAMINATION.

CIVIL BRANCH.

Part I (Written)

		Maximum Marks.
7	Strength of Materials and Theory of Structures II	100
8	Structural Engineering II	100
9	Hydraulics and Hydraulic Machinery II (Civil)	100
10	Design and Drawing I	100
11	Surveying	100
12	Irrigation, Docks and Harbours	100
13	Sanitary Engineering	100
14	Design and Drawing II	100

Part II (Practical)

Strength of Materials	100
Hydraulics	100
Surveying	100
Design and Drawing (*viva voce*) ...	100

MECHANICAL BRANCH.

Part I (Written)

17	Heat Engines II	100
18	Electrical Technology II	100
19	Theory of Machines	100
20	Hydraulics and Hydraulic Machinery II (Mechanical and Electrical)	
	or	
20	(*a*) Aero Engineering	100
21	Fuels, Gas Plant and Boilers	100
22	Workshop Practice and Machine Tools ...	100
23	Design and Drawing	100
24	Engineering Economics	100

Part II (Practical)	Maximum Marks.
Mechanical Engineering	100
Electrical Engineering	50
Hydraulics	50
Workshops	100
Design and Drawing (*viva voce*) ...	100

ELECTRICAL BRANCH.

Part I (Written)

28 Heat Engines II	100
29 Electrical Theory and Measurements ...	100
30 Theory and Calculation of Electrical Apparatus II	100
20 Hydraulics and Hydraulic Machinery II (Mechanical and Electrical)	100
31 Generation and Utilization	100
32 Transmission and Distribution	100
33 Design, Estimate and Drawing of Electrical Supply Systems	100
34 Design and Drawing II	100

Part II (Practical).

Electrical Engineering	150
Mechanical Engineering	50
Hydraulics	50
Workshops	50

TELE-COMMUNICATION BRANCH.

Part I (Written).

36 Engineering Electronics II	100
37 High Frequency Measurements	100
18 Electrical Technology II	100
38 Transmission Circuits	100
39 Broadcasting (Reception) I	100
40 Broadcasting (Transmission) II	100
41 Wire Communication I (Telegraphy) ...	100
42 Wire Communication II (Telephony) ...	100

Part II (Practical).

	Maximum Marks.
Electrical Engineering	50
Workshops	50
Radio Engineering	150
Telegraphy and Telephony Laboratory ...	50
Design and Drawing (*viva voce*) ...	100

HIGHWAY BRANCH.

Part I (Written).

7	Strength of Materials and Theory of Structures II	100
43	Bridge Engineering	100
44	Bridge Design and Drawing	100
45	Geology and Chemistry of Road Materials	100
46	Surveying	100
47	Highway Engineering I	100
48	Highway Engineering II	100
49	Highway Design and Drawing	100

Part II (Practical).

Strength of Materials	50
Highway Engineering	100
Surveying	100
Design and Drawing (*viva voce*) ...	100
Geology and Chemistry	50

AERONAUTICAL BRANCH.

Part I (Written).

53	Fluid Mechanics	100
54	Technical Aerodynamics	100
55	Air Navigation	100
56	Meteorology	100
57	Airplane Design	100
58	Aircraft Stress Analysis	100
59	Design Practice	100
60	Production Planning	100

Part II (Practical).

	Maximum Marks.
Aircraft Drafting and Design (*viva voce*).	100
Testing of Airplane Structures ...	100
Model Testing and Performance Reduction	100
Workshops	100

AUTOMOTIVE BRANCH.

Part I (Written).

63	Automotive Engines II	100
64	Chassis and its Components	100
19	Theory of Machines	100
65	Metallurgy and Materials of Construction and Specifications	100
66	Fuels, Gas Plant and Heat Transmission ...	100
22	Workshop Practice and Machine Tools ...	100
67	Chassis Design Practice	100
68	Engineering Economics and Motor Vehicles Trade Laws and Acts	100
69	Workshop Practice II	100
70	Design and Drawing	150

Part II (Practical).

Automotive Engineering	200
Workshops (Automotive)	200
Workshops (General)	100
Design and Drawing (*vive voce*) ...	100

TEXTILE BRANCH.

Part I (Written).

77	Preparation and Spinning II*	100
78	Preparation and Weaving II*	100
79	Fabric Structure and Designing II* ...	100
80	Cloth Analysis and Costing of Yarn and Cloth*	100

* Common with B.Sc. (Tech.)

	Maximum Marks.
81 Textile Engineering	100
82 Mill Planning and Organization	100
83 Economics of Cotton Industry and Trade ...	100

Part II (Practical).

Spinning	100
Weaving	100
Fabric Structure	50
Cloth Analysis	50

3. Candidates may present themselves for the First, Second, Third and Final B. E. Examinations after undergoing the prescribed courses of study for each of the examinations for a period of one academic year in a Constituent or Affiliated College. Candidates may also present themselves simultaneously for (i) the First and Second B.E. Examinations, and (ii) the Third and Final B.E. Examinations.

Percentage of marks required for a pass.

4. (*a*) Candidates appearing only for the First or the Second B.E. Examination and obtaining not less than 35 per cent in each of the subjects of Part I, 45 per cent in each of the subjects of Part II and 40 per cent in the aggregate of Parts I and II, shall be declared to have passed the examination in which they appear.

(*b*) Candidates appearing for the First and the Second B. E. Examinations together or for a portion thereof, and obtaining not less than 35 per cent in each of the subjects of Part I, 45 per cent in each of the subjects of Part II, and 40 per cent in the aggregate for the First and the Second B. E. Examinations shall be declared to have passed these examinations. Regulation 4 (*a*) above will, however, be applicable to candidates who fail in the two examinations taken together.

(*c*) Candidates appearing only for the Third or the Final B.E. Examination and obtaining not less than 40 per cent in each of the subjects of Part I, 50 per cent in each of the subjects of Part II, and 50 per cent in the aggregate of Parts I and II, shall be declared to have passed the examination in which they appear.

(*d*) Candidates appearing for the Third and the Final B.E. Examinations together, or for a portion thereof, and obtaining not less than 40 per cent in each of the subjects of Part I, 50 per cent in each of the subjects of Part II, and 50 per cent of the aggregate of the Third and the Final B.E. Examinations, shall be declared to have passed these examinations. Regulation 4 (*c*) above will, however, be applicable to candidates who fail to pass the two examinations together.

Exemption in subjects passed.

5. (*a*) Candidates appearing only for the First or the Second B.E. Examination and failing in any of the subjects in that examination, shall be exempted from examination in the subjects in which they have passed, provided they have obtained not less than 40 per cent in the aggregate of that examination.

(*b*) Candidates appearing for the First and the Second B.E. Examinations together, and failing in any of the subjects, shall be exempted from examination in the subjects in which they have passed, provided they have obtained not less than 40 per cent in the aggregate of the two examinations.

(*c*) Candidates appearing only for the Third or the Final B.E. Examination and failing in any of the subjects in that examination, shall be exempted from examination in the subjects in which they have passed, provided they have obtained not less than 50 per cent in the aggregate of that examination.

(*d*) Candidates appearing for the Third and the Final B.E. Examinations together and failing in any of the subjects shall be exempted from examination in the subjects in which they have passed, provided they have obtained not less than 50 per cent in the aggregate of the two examinations.

(*e*) Candidates failing in any examination shall be exempted from examination in the subjects in which they have obtained not less than 50 per cent of the marks.

Admission to examinations.

6. (*a*) Candidates shall not be admitted to the Third B.E. Examination unless they have (*a*) passed the First B.E. Examination taken separately and have either passed the Second B.E. Examination or have obtained not less than 40 per cent in the aggregate of that

examination, or (*b*) have passed the First and the Second B.E. Examinations taken together or obtained not less than 40 per cent in the aggregate of these examinations, provided they have passed the First B.E. Examination.

(*b*) Candidates shall not be admitted to the Final B.E. Examination unless they have passed the Second B.E. Examination.

Classification of successful candidates.

7. Candidates who pass the First and the Second B.E. Examinations separately on the first occasion of appearing therefor, shall be ranked in the order of proficiency as determined by the total marks of the two examinations.

Candidates who pass the First or the Second B.E. Examination at a subsequent appearance or the two examinations taken together shall be ranked separately.

Candidates who pass the Third and the Final B.E. Examinations separately on the first occasion of appearing therefor, shall be ranked in the order of proficiency as determined by the total marks of the two examinations and shall be arranged in two classes, the first consisting of those who have obtained not less than 60 per cent and the second consisting of all the others. Candidates who pass in the first class and who obtain not less than 66 per cent in the aggregate shall be deemed to have passed with Honours.

Candidates who pass the Third or the Final B.E. Examination at a subsequent appearance or the two examinations together shall be ranked separately in the second class.

Qualifying in more than one Branch.

8. Candidates who have passed the B.E. Degree Examination in the Mechanical, Electrical, or Tele-Communication Branch may present themselves for the examination in any of the other two Branches after undergoing a course of study in that Branch for one academic year.

Candidates obtaining not less than 50 per cent in the aggregate of the written and practical examinations prescribed below for the Branch will be considered to have qualified in that Branch.

Candidates obtaining 60 per cent in the aggregate shall be placed in the first class and those obtaining not less than 66 per cent shall be deemed to have passed with Honours.

Candidates in the different Branches shall be examined in the subjects as shown under:—

(*a*) Candidates who have passed the B.E. Degree Examination in the Mechanical Branch and who wish to qualify for the Electrical or Tele-Communication Branch shall be examined as under:—

	For Electrical Branch.	*Maximum marks.*
26	Theory and Calculation of Electrical Apparatus I ...	100
27	Design and Drawing I	100
29	Electrical Theory and Measurements ...	100
30	Theory and Calculation of Electrical Apparatus II ...	100
31	Generation and Utilization	100
32	Transmission and Distribution	100
33	Design, Estimate and Drawing of Electric Supply Systems	100
34	Design and Drawing II	100
	Electrical Engineering (Practical) ...	150
	Design and Drawing (*viva voce*) ...	100

For Tele-Communication Branch.

27	Design and Drawing I (as for Electrical) ...	100
35	Engineering Electronics I	100
36	Engineering Electronics II	100
37	High Frequency Measurements	100
38	Transmission Circuits	100
39	Broadcasting (Reception) I	100
40	Broadcasting (Transmission) II	100
41	Wire Communication I (Telegraphy) ...	100
42	Wire Communication II (Telephony) ...	100
	Radio Engineering (Practical)	150
	Telegraphy and Telephony (Practical) ...	50
	Design and Drawing (*viva voce*)	100
	Apparatus Construction Laboratory ...	50

(*b*) Candidates who have passed the B.E. Degree Examination in the Electrical Branch and who wish to qualify for the Tele-Communication or Mechanical Branch shall be examined as under:—

	For Tele-Communication Branch.	*Maximum Marks.*
35	Engineering Electronics I	100
36	Engineering Electronics II	100
37	High Frequency Measurements	100
38	Transmission Circuits	100
39	Broadcasting (Reception) I	100
40	Broadcasting (Transmission) II	100
41	Wire Communication I (Telegraphy) ...	100
42	Wire Communication II (Telephony) ...	100
	Radio Engineering (Practical)	150
	Telegraphy and Telephony (Practical) ...	50
	Design and Drawing (*viva voce*)	100

For Mechanical Branch.

4	Structural Engineering	
	or	
4	(*a*) Auto Engineering	100
15	Heat Engines I (as for Mechanical) ...	100
17	Heat Engines II (as for Mechanical) ...	100
19	Theory of Machines*	100
21	Fuels, Gas Plant and Boilers	100
22	Workshop Practice and Machine Tools ...	100
23	Design and Drawing	100
24	Engineering Economics	100
	Mechanical Engineering (Practical) ...	100
	Workshops (Practical)	100
	Design and Drawing (*viva voce*)	100

* NOTE.—Candidates who have qualified for the B.E. Degree Examination in Electrical Branch according to Pre-1944 Regulations will not be required to appear for Theory of Machines.

(*c*) Candidates who have passed the B.E. Degree Examination in the Tele-Communication Branch and who wish to qualify for the Electrical or Mechanical Branch shall be examined as under :—

For Electrical Branch.

		Maximum Marks.
3	Hydraulics I	100
20	Hydraulics and Hydraulic Machinery II.	100
26	Theory and Calculation of Electrical Apparatus I	100
28	Heat Engines II	100
29	Electrical Theory and Measurements ...	100
30	Theory and Calculation of Electrical Apparatus II	100
31	Generation and Utilization	100
32	Transmission and Distribution	100
33	Design, Estimate and Drawing of Electric Supply Systems	100
34	Design and Drawing II	100
	Electrical Engineering (Practical) ...	150
	Mechanical Engineering (Practical) ...	50
	Hydraulic Engineering (Practical) ...	50
	Design and Drawing (*viva voce*)	100

For Mechanical Branch.

3	Hydraulics I	100
4	Structural Engineering	
	or	
4	(*a*) Auto Engineering	100
17	Heat Engines II	100
19	Theory of Machines	100
20	Hydraulics and Hydraulic Machinery II	
	or	
20	(*a*) Aero Engineering	100
21	Fuels, Gas Plant and Boilers	100
22	Workshop Practice and Machine Tools ...	100

		Maximum Marks.
23	Design and Drawing	100
24	Engineering Economics	100
	Mechanical Engineering (Practical) ...	100
	Hydraulic Engineering (Practical) ...	50
	Workshops (Practical)	100
	Design and Drawing (*viva voce*)	100

9. Candidates who have passed the B.E. Degree Examination in the Civil Branch or Highway Branch may present themselves for examination in the other Branch after undergoing a course of study in that Branch for one academic year.

Candidates obtaining not less than 50 per cent in the aggregate of the marks in the subjects prescribed below for the Branch, will be considered to have qualified in that Branch. Those obtaining 60 per cent in the aggregate shall be placed in the first class and those obtaining not less than 66 per cent in the aggregate shall be deemed to have passed with Honours.

(*a*) Candidates who have passed the B.E. Degree Examination in the Civil Branch and who wish to qualify for the Highway Branch shall be examined as under :—

For Highway Branch.

		Maximum Marks
43	Bridge Engineering	100
44	Bridge Design and Drawing	100
45	Geology and Chemistry of Road Materials.	100
47	Highway Engineering I	100
48	Highway Engineering II	100
49	Highway Design and Drawing	100
	Highway Engineering (Practical) ...	100
	Geology and Chemistry (Practical) ...	50
	Design and Drawing (*viva voce*) ...	100

(*b*) Candidates who have passed the B.E. Degree Examination in Highway Branch and who wish to qualify for the Civil Branch shall be examined as under :—

	For Civil Branch	*Maximum Marks.*
8	Structural Engineering II	100
9	Hydraulics and Hydraulic Machinery II ...	100
10	Design and Drawing I	100
11	Surveying	100
12	Irrigation, Docks and Harbours	100
13	Sanitary Engineering	100
14	Design and Drawing II	100
	Hydraulics (Practical)	100
	Surveying (Practical)	100
	Design and Drawing (*viva voce*) ...	100

Duration of examinations.

10. All the written examinations shall be of three hours' duration except Design and Drawing of the Final B.E. Examination for the Automotive Branch, which will be of four hours' duration. All the practical examinations shall be of three hours' duration except the following :—

4 hours for Field Work and 2 hours for Calculation and Plotting for all examinations in Surveying; 4 hours for the Final B.E. or B.E. Part II Examinations in Mechanical Engineering Laboratory for Mechanical Branch, Electrical Engineering Laboratory for Electrical Branch, Radio Engineering Laboratory for Tele-Communication Branch, and Workshops for Electrical and Tele-Communication Branches; 8 hours for the Final B.E. or B.E. Part II Examinations in Workshops for Mechanical and Automotive Branches, and in Automotive Engineering Workshops for Automotive Branch.

Transitory Regulations.

11. *First Examination in Engineering.*—(*a*) Candidates who have passed F. E. Part I before 1948 shall be permitted to appear for the Second B.E. Examination under the New Regulations after undergoing the prescribed courses of study for that examination.

(*b*) Candidates who have failed in F. E. Part II shall appear for the same examination under the Old Regulations.

(*c*) Candidates who have failed in F. E. Part I before 1948 shall be permitted to appear for F. E. Part I and F.E. Part II examinations together under the Old Regulations after undergoing the prescribed courses of study for F.E. Part II.

(*d*) Candidates appearing for F.E. under the Old Regulations, shall not be admitted to the Third B.E. Examination under the New Regulations until they have passed F.E.

12. *Bachelor of Engineering Examination.*—(*a*) Candidates who have passed B.E. Part I before 1948 shall be permitted to appear for B.E. Part II under the Old Regulations.

(*b*) Candidates who have failed in B.E. Part II shall be permitted to appear for the same examination under the Old Regulations.

(*c*) Candidates who have failed in B.E. Part I before 1948 will be permitted to appear for B.E. Part I and B.E. Part II examinations together under the Old Regulations after undergoing the prescribed courses of study for B.E. Part II.

13. Candidates who have completed the B.E. Degree Course before March 1944 and those who have passed the F.E. Examination according to the Old Regulations in or after 1944 shall be permitted to appear for the B.E. Degree Examination according to the Old Regulations.

This Regulation shall be in force till 1949.

CHAPTER LXX.

Degree of Bachelor of Teaching (B.T.)

Eligibility for the Degree.

1. No candidate shall be eligible for the Degree of Bachelor of Teaching unless he has taken a Degree in this University or a Degree in some other University accepted by the Syndicate as equivalent thereto and has also passed the prescribed examination.

Eligibility for admission to Examination.

2. No candidate shall be admitted to the B.T. Degree Examination, unless he forwards before the date of the commencement of the Examination satisfactory evidence of having qualified for a Degree in this University or in some other University accepted by the Syndicate as equivalent thereto, and produces before the examination a certificate that he has undergone the prescribed course in a Constituent or an Affiliated Training College.

Course of Study.

3. The course of study, which shall last for one academic year, shall include—

(i) A. General Principles of Education.

B. Educational Psychology.

C. General Methods.

D. School Organisation and Hygiene.

E. Methods appropriate to the teaching of *two* of the following subjects:—

(a) An Indian Language.

(b) English.

(c) Primary Education.

(d) Mathematics.

(e) Physical Science.

(f) Natural Science.

(g) History.

(h) Geography.

(i) Home Science.

(j) Music.

(For Syllabuses *vide* **Appendix XIX.**)

Provided, however, that, of the two subjects offered under *E* above, one should be of the Degree standard, and the other should be preferably of the Degree standard, whenever possible, or at least of the Intermediate or Diploma standard; provided further that this will not apply to "Primary Education", and provided also that for a period of three years (1947–48 to 1949–50) the following optional subjects will be exempted from the above requirements, subject to the Syndicate being satisfied on a report of the Professor concerned and the Principal of the College regarding the standard attained by the candidates in the subject:—

(*a*) Geography.

(*b*) Music.

(ii) Practical training including observation and practice in teaching, the making of teaching equipment and school organisation.

(iii) Candidates shall also undergo courses in (a) Physical Education and (b) Art or Music or Crafts as prescribed by the College.

Scheme of Examination.

4. (*a*) *Written Examination*—The subjects and the scheme of examination shall be as follows:—

			Hours.	*Marks.*
1.	Theory of Education A.B. (This paper shall consist of two questions under A and four questions under B).	...	3	100
2.	General Methods (C)	...	$2\frac{1}{2}$	75
3.	School Organisation and Hygiene (D)	...	$2\frac{1}{2}$	75

	Hours.	Marks.
4. Methods of Teaching, (E) Optional Subjects—*Two* of the following:—		
(a) An Indian Language. (b) English. (c) Primary Education. (d) Mathematics. (e) Physical Science. (f) Natural Science. (g) History. (h) Geography. (i) Home Science. (j) Music.	$2\frac{1}{2}$ hrs. each	75
Total (5 papers)	...	400

(*b*) *Practical Tests*:—

Each College shall be responsible to the University for conducting Practical Tests in Teaching and shall report to the University in the month of February the names of students approved or deferred.

The report of the College in the case of each student shall be based on Lecturers' reports of at least 5 lessons in each subject. Each lesson shall be reported on separately. The Lecturers' reports shall be filed for reference by the University in the case of students not approved by the College.

In the case of candidates deferred by the College a further Practical Test shall be conducted by the University.

Passing minimum.

5. No candidate shall be admitted to the B.T. Degree unless he has passed both the Practical Test and the Written Examination:

Provided, however, that a candidate who fails in the Practical Test and passes in the Written Examination shall be regarded as having failed in the Practical Test only and shall be permitted to appear again for the Practical Test, and *vice versa*.

A candidate shall not be permitted to appear for the Practical Test on more than two occasions; provided,

however, it shall be competent for the Syndicate, if the Board of Examiners so recommend, to permit the candidate to appear on a third occasion.

A candidate shall be declared to have passed the Written Examination if he obtains (i) not less than 35 per cent in each of the five papers and (ii) not less than 40 per cent in the five papers taken together. All the other candidates shall be deemed to have failed in the examination.

Classification of successful candidates.

Of the successful candidates, those who obtain not less than 60 per cent of the total marks shall be placed in the First Class, and those who obtain not less than 50 per cent of the total marks shall be placed in the Second Class. The remaining successful candidates shall be placed in the Third Class.

Successful candidates who obtain not less than 60 per cent of the marks in a paper relating to 4 (Methods of Teaching) shall be declared to have obtained distinction in that subject.

6. Notwithstanding anything contained in Regulation 3 above, about the duration of the prescribed course, it shall be competent for the Syndicate to admit to the B.T. Degree Examination certificated *bona fide* trained teachers who have passed the B.A. Degree Examination and who have undergone a course of instruction in a Constituent or an Affiliated Training College for Teachers during the third term and attended a vacation course conducted by a Constitutent or an Affiliated Training College for Teachers and who satisfy the general rules relating to the grant of exemption to *bona fide* certificated trained teachers prescribed by the Syndicate for admission to the Matriculation, Intermediate and B. A. Degree Examinations.

7. A candidate who has taken the B.T. Degree shall be permitted to appear again for the examination in a new subject or subjects under Section E. *Methods of Teaching,* provided that he has taken a Pass Degree or a University Diploma in the additional subject or subjects selected, and has had at least three years of teaching experience in such a subject or subjects.

In the case of such a candidate, the practical test in the new subject or subjects selected by him shall be conducted by the University. The number of times such a candidate shall be permitted to appear for the practical test in the new subject or subjects shall be the same as that laid down in Regulation 5 *supra*.

He shall be declared to have passed the examination if he obtains not less than 40 per cent of the marks in each new subject.

Such candidates shall not be admitted at a Convocation a second time, but special certificates setting forth the additional subject or subjects passed by them and the dates of such examination shall be given to them.

CHAPTER LXXI.

Degree of Master of Education (M.Ed.)

Eligibility for admission to the course and the Examination.

1. No candidate shall be admitted to the course unless he has taken the B. T. Degree of this University or a Degree in some other University accepted by the Syndicate as equivalent thereto.

The course may be taken immediately after the B.T. course or equivalent course; or after an interval of some years, provided the applicant has been engaged in teaching for at least (*a*) one year if the interval between the *two* courses is not more than three years, and (*b*) one-third of the interval in the case of an applicant who has had an interval of more than three years between the *two* courses. (In this connection the word 'teaching' connotes also inspection.)

No candidate shall be eligible for the Degree of M.Ed. unless he has completed the prescribed course of study and has passed the qualifying examination and has satisfied the examiners in a thesis on an approved subject.

Course of Study.

2. The course of study which shall last for one academic year, shall include—

A. Educational Psychology with emphasis on Experimental Education.

B. Educational Organisation and Administration.

C. History of Education.

D. Current Problems in Indian Education—Six problems to be specified by the Department from time to time.

E. Thesis—Candidates shall be required to submit a thesis in a subject approved by the University. The thesis shall be prepared under the direction of a Teacher approved by the University and submitted two weeks before the M.Ed. Degree Examination.

The subject proposed for the thesis shall be submitted to the University for approval not later than the 31st August.

(For Syllabuses *vide* **Appendix XX.**)

Scheme of Examination. 3. The subjects and the scheme of examination shall be as follows:—

		Hours.	*Marks.*
1.	Educational Psychology ...	3	100
2.	Educational Organisation and Administration	3	100
3.	History of Education ...	3	100
4.	Current Problems in Indian Education	3	100
5.	Thesis		
	Total ...		400

A report on the practical work of each student in Psychology shall be submitted to the Board of Examiners by the Lecturer concerned.

Marks qualifying for a Pass. 4. Candidates shall be declared to have passed the examination if they obtain not less than 50 per cent of the marks in each of any two of the papers and not less than 35 per cent in each of the remaining papers and have satisfied the Examiners in the thesis.

5. A candidate shall not be permitted to appear for the M.Ed. Degree Examination on more than two occasions.

A candidate who has failed in the Written Test or in the Thesis may re-appear for the M. Ed. Degree Examination once only in the Written Test or submit a Thesis, as the case may be, at the next succeeding examination, provided, however, it shall be competent for the Syndicate, if the Advisory Board so recommends, to permit the candidate, in exceptional circumstances, such as illness, to take the Written Test or submit a fresh Thesis on a later occasion.

A candidate who has failed in the Written Test only shall not be required to put in any additional attendance before reappearing for the written examination; and a candidate whose Thesis has failed to reach the prescribed standard shall be required to submit a Thesis only, which shall be on a different subject. Such a candidate shall be permitted to submit the fresh Thesis only after the production of an additional attendance certificate for one term in a college where the course is organised.

CHAPTER LXXII.

Degree of Bachelor of Science in Agriculture (B.Sc. Ag.)

1. Candidates for the Degree of Bachelor of Science in Agriculture (B.Sc. Ag.) shall be required—

Conditions of admission.

(1) to have passed the Intermediate Examination in Arts and Science of this University or an examination of some other recognised University accepted by the Syndicate as equivalent thereto, having offered as optional subjects Chemistry and any two of the following subjects:—

Mathematics, Physics, Natural Science, Botany, Zoology including Human Physiology, and Agriculture;

(2) to have undergone subsequently a further course of study in Agriculture extending over three years at a College of Agriculture, recognised by or affiliated to this University, and to have passed the examination for the Degree hereinafter prescribed.

Course of Study.

2. The course of study in Agriculture shall comprise both theoretical and practical instruction in the following subjects:—

(i) Agriculture.
(ii) Agricultural Botany.
(iii) Agricultural Chemistry.
(iv) Agricultural Zoology.
(v) Agricultural Engineering.
(vi) Animal Hygiene.

Syllabus.

3. The syllabus of studies under each of the above subjects shall be prescribed from time to time by the Academic Council on the recommendation of the Board of Studies in Agriculture. (For Syllabuses *vide* **Appendix XXI.**)

Examinations.

4. For the Degree of B.Sc. in Agriculture there shall be three examinations. No candidate shall be eligible for the Degree unless he has completed the course of study prescribed and passed all the examinations.

5. The examination in each subject shall be both written and practical. In conjunction with each practical examination there may be an oral examination of each candidate. Each candidate shall produce his laboratory and field note-books at the time of the practical examination.

6. The First Examination shall be held at the end of the first year of the course of study and shall be in the following subjects:—

(i) Agriculture.
(ii) Botany.
(iii) Chemistry.
(iv) Zoology.

7. The Second Examination shall be held at the end of the second year of the course of study and shall be in the following subjects:—

(i) Agriculture—Plant Husbandry.
(ii) Agricultural Engineering.
(iii) Agricultural Zoology.
(iv) Animal Hygiene.

8. The Final Examination shall be held at the end of the third year of the course of study and shall be in the following subjects:—

(i) Agriculture—Economics and Farm Management.
(ii) Agriculture—Animal Husbandry.
(iii) Agricultural Botany.
(iv) Agricultural Chemistry.

9. No candidate will be permitted to appear for the Examination unless he produces a certificate of having completed the prescribed course.

10. No candidate shall be permitted to appear for the Second Examination unless he has passed the First Examination.

11. A candidate who fails in not more than one subject in the Second Examination will be permitted to appear for the Final Examination as well as for the examination in the subject in which he has failed.

Marks qualifying for a Pass.

12. A candidate shall be declared to have passed the First Examination if he obtains not less than 40 per cent of the marks in each of the four subjects prescribed for the examination.

13. A candidate shall be declared to have passed the Second Examination if he obtains not less than 40 per cent of the marks in each of the four subjects prescribed for the examination.

14. A candidate shall be declared to have passed the Final Examination if he obtains not less than 40 per cent of the marks in each of the four subjects prescribed for the examination.

Classification of successful candidates.

15. A candidate who obtains 40 per cent in any subject in the Second or Final Examination shall be declared to have passed in that subject. Any candidate who passes the Second and Final Examinations at the first appearance with 60 per cent of the total marks in each examination shall be declared to have passed in the First Class. All the other successful candidates shall be declared to have passed in the Second Class. Any candidate who obtains a pass in the Second or Final Examination at the first appearance and secures not less than 75 per cent of the marks in any subject shall be declared to have passed with distinction in that subject. With regard to Agriculture, however, the marks of the Second and Final Examinations will be considered together for the award of distinction.

Successful candidates at the Final Examination shall be ranked in the order of merit.

16. Candidates who fail in the First Examination will be permitted to appear at any subsequent examination on payment of the prescribed fees and need not produce any additional attendance certificate.

Candidates who fail in any of the subjects in the Second and Final Examinations will be permitted to appear in such subjects at any subsequent examination on payment of the prescribed fees and need not produce any additional attendance certificate.

CHAPTER LXXIII.

Degree of Bachelor of Veterinary Science (B.V.Sc.)

1. Candidates for the Degree of Bachelor of Veterinary Science (B.V.Sc.) shall be required:

(i) to have completed the age of seventeen years on or before the date of admission to the Course of B.V.Sc. Preliminary in a college of Veterinary Science;

Eligibility for admission to B.V.Sc.

(ii) to have passed the Intermediate Examination in Arts and Science of this University or an examination of some other recognized University, accepted by the Syndicate as equivalent thereto, having offered Chemistry or Natural Science as one of the optional subjects;

(iii) to have subsequently studied for a period of four academic years and one term in a college of Veterinary Science recognized by or affiliated to this University; and

(iv) to have passed the B.V.Sc. Preliminary, Intermediate Part I, Intermediate Part II, and Final Examinations.

Duration of the Course.

2. The course for the Degree of B.V.Sc. shall extend over a period of four academic years and one term (ordinarily consecutive).

Academic terms.

3. The academic year shall consist of three terms: July to September; October to December; and January to March, except in the case of the final year, when it shall be four terms and shall in addition extend from April to June.

4. The examination for the Degree shall consist of a Preliminary; Intermediate, Part I; Intermediate, Part II; and a Final Examination. The examinations shall be held twice a year in the months of April and October for Preliminary, Intermediate, Part I, and Intermediate Part II, and in June and December for the Final B.V.Sc. and shall ordinarily commence on the following dates*:—

Preliminary—1st April and 1st October.
Intermediate, Part I—1st April and 1st October.
Intermediate, Part II—1st April and 1st October.
Final—15th June and 15th December.

(*_Vide_ Ordinance—Chapter XXXVIII.)

B.V.Sc. PRELIMINARY.

Course of Study.

5. A candidate for this examination shall undergo a course of instruction in the following subjects extending over one academic year:—

(*a*) Biology.

(*b*) Chemistry.

(*c*) Animal Husbandry, Part I (Handling and Shoeing).

Scheme of Examination.

6. Candidates for the above examination shall be examined in each of the above subjects and the examination in each subject except in Animal Husbandry, Part I (Handling and Shoeing) shall consist of—

(i) a paper of 3 hours' duration;

(ii) a practical examination; and

(iii) an oral examination.

The examination in Animal Husbandry, Part I (Handling and Shoeing) shall consist of only a practical and oral examination.

Exemption in certain subjects to graduates in science subjects.

7. Candidates who have passed the Physical or Natural Science group of the B.A., B.Sc., B.Sc. (Hons.) or B.A. (Hons.) Degree Examination of this University with Chemistry or Zoology as their main optional subject and Botany as the subsidiary for Zoology or an examination of any other Indian University accepted by the Syndicate as equivalent thereto shall be exempted from undergoing the course and the examination in the respective subjects in which they have passed the Degree examination, provided, however, that exemption in the case of graduates of other Universities shall be restricted to not more than one subject which shall be the main subject in which they have obtained the highest proficiency. Such candidates shall, however, be required to pay the fee prescribed for the whole examination.

Passing minimum.

8. Candidates shall be declared to have passed the Preliminary Examination if they obtain in each subject not less than one-half of the marks in the written part and not less than one-half of the marks in the practical and oral parts taken together in the subjects of Biology and Chemistry and not less than one-half of the marks in the practical and oral parts taken together in the subject of Animal Husbandry, Part I (Handling and Shoeing). All the other candidates shall be deemed to have failed in the examination.

Examination by subjects.

9. Candidates who fail in the examination but obtain the prescribed minimum marks for a pass in any subject shall be exempted from re-examination in that subject.

Further study for failed candidates.

10. Candidates who fail more than once in the examination shall revert to the year of study concerned and undergo a further course of study for one term in the subject or subjects in which they failed before they are permitted to re-appear for the examination, in which case, the period of study between the first and second appearances spent in the courses for the next higher examination shall not be allowed to count for the grant of the certificates prescribed therefor.

Classification of successful candidates.

11. Candidates who pass the whole examination at their first apearance shall be arranged in two classes—the first consisting of those who obtain not less than 70 per cent of the aggregate marks and the second consisting of all the others. They shall be arranged in either class in the order of their total marks.

Any candidate who obtains a pass in the examination at the first appearance and secures not less than 75 per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who complete the examination by passing subject by subject shall be placed in a separate group in the second class.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

Training in a Farm.

12. At the end of the first year course of study, the students shall have to undergo a course of practical training in a Farm for 1½ months during the vacation.

B.V.Sc. INTERMEDIATE—PART I.

Course of Study.

13. A candidate for this examination shall undergo a course of instruction in the following subjects extending over an academic year except in the subjects of Anatomy (including Histology and Embryology) and Physiology (including Experimental Physiology and Biochemistry) in which the courses of instruction shall extend over the first and second years of study:—

(*a*) Anatomy including Histology and Embryology.

(*b*) Physiology including Experimental Physiology and Biochemistry.

(*c*) Animal Husbandry, Part II (Hygiene).

(*d*) Parasitology.

Qualifications for admission.

14. No candidate shall be admitted to the B.V.Sc. Intermediate, Part I Examination unless he has passed the B.V.Sc. Preliminary Examination and has undergone a course of instruction in the prescribed subjects, including practical training for 1½ months in a Farm.

Scheme of Examination.

15. Candidates for the above examination shall be examined in each of the above subjects and the examination in each subject shall consist of—

(i) a paper of 3 hours' duration;

(ii) a practical examination; and

(iii) an oral examination.

Passing minimum.

16. Candidates shall be declared to have passed the Intermediate, Part I Examination, if they obtain in each subject not less than one-half of the marks in the written part and not less than one-half of the marks in the practical

and oral parts taken together. All the other candidates shall be deemed to have failed in the examination.

Examination by subjects.

17. Candidates who fail in the examination but obtain the prescribed minimum marks for a pass in any subject shall be exempted from re-examination in that subject.

Further study for failed candidates.

18. Candidates who fail more than once in the examination shall revert to the next lower year of study concerned and undergo a further course of study for one term in the subject or subjects in which they failed before they are permitted to re-appear for the examination, in which case the period of study between the first and second appearances spent in the courses for the next higher examination shall not be allowed to count for the grant of the certificates prescribed therefor.

Classification of successful candidates.

19. Candidates who pass the whole examination at their first apearance shall be arranged in two classes—the first consisting of those who obtain not less than 70 per cent of the aggregate marks and the second consisting of all others. They shall be arranged in either class in the order of their total marks.

Candidates who pass in the examination at the first appearance and who obtain not less than 75 per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who complete the examination by passing subject by subject shall be placed in a separate group in the second class.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

Training in a Farm.

20. At the end of the second year course of study the students shall have to undergo a course of practical training in a Farm for $1\frac{1}{2}$ months during the vacation.

B. V. Sc. INTERMEDIATE—PART II.

Course of Study.

21. A candidate for this examination shall undergo a course of instruction in the following subjects extending over an academic year, except in the subjects of Pathology and Bacteriology (including Immunology) and Pharmacology (including Materia Medica and Pharmacy) in which the courses of instruction shall extend over the second and third years of study—

(*a*) Pathology and Bacteriology including immunology.

(*b*) Pharmacology including Materia Medica and Pharmacy.

(*c*) Animal Husbandry, Part III (Nutrition and Dairy Science).

Qualification for admission.

22. No candidate shall be admitted to the B. V. Sc. Intermediate, Part II Examination unless he has passed the B.V.Sc. Intermediate, Part I Examination, has undergone a course of instruction in the prescribed subjects including practical training for $1\frac{1}{2}$ months in a Farm, and produces a certificate of hospital attendance for one academic year.

Scheme of Examination.

23. Candidates for the above examination shall be examined in the above subjects and the examination shall consist of—

(i) a paper of 3 hours' duration;

(ii) a practical examination; and

(iii) an oral examination in each of the following subjects:—

(*a*) Pathology and Bacteriology and Immunology.

(*b*) Pharmacology including Materia Medica and Pharmacy;

(*c*) Animal Nutrition; and

(*d*) Dairy Science.

Passing minimum.

24. Candidates shall be declared to have passed the Intermediate, Part II Examination if they obtain in each subject not less than one-half of the marks in the written part and not less than one-half of the marks in the practical and oral parts taken together. All the other candidates shall be deemed to have failed in the examination.

Examination by subjects.

25. Candidates who fail in the examination but obtain the prescribed minimum marks for a pass in any subject shall be exempted from re-examination in that subject.

Further study for failed candidates.

26. Candidates who fail more than once in the examination shall revert to the next lower year of study concerned and undergo a further course of study for one term in the subject or subjects in which they failed before they are premitted to re-appear for the examination, in which case the period of study between the first and second appearances spent in the courses for the next higher examination shall not be allowed to count for the grant of the certificates prescribed therefor.

Classification of successful candidates.

27. Candidates who pass the whole examination at their first appearance shall be arranged it two classes—the first consisting of those who obtain not less than 70 per cent of the aggregate marks, and the second consisting of all the others. They shall be arranged in either class in the order of their total marks.

Candidates who pass in the examination at the first appearance and who obtain not less than 75 per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who complete the examination by passing subject by subject shall be placed in a separate group in the second class.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

Training in a Farm.

28. At the end of the third year of study, the students shall have to undergo a course of practical training in a Farm for one and a half months during the vacation.

B.V.Sc.—FINAL.

Course of Study.

29. A candidate for this examination shall undergo a course of instruction in the following subjects extending over four terms except in the subject of Surgery and Medicine in which the courses of instruction shall extend over the third and fourth years of study:—

(i) Medicine including Therapeutics and Toxicology.

(ii) Surgery including Soundness, Obstetrics and Veterinary Jurisprudence.

(iii) Animal Husbandry, Part IV, (Genetics and Breeding).

(iv) Meat Inspection.

Qualification for admission.

30. No candidate shall be admitted to the B.V.Sc. Final Examination unless he has passed the B.V.Sc. Intermediate, Part II Examination, has undergone a course of instruction in the prescribed subjects including practical training for one and a half months in a Farm spent during vacation at the end of the third year of study, and two months during the fourth term of the final year and produces a certificate of hospital attendance for three terms.

Scheme of Examination.

31. Candidates for the above examination shall be examined in the above subjects and the examination shall consist of—

(i) a paper of three hours' duration;

(ii) a practical examination; and

(iii) an oral examination

in each of the following subjects:—

(*a*) Medicine including Therapeutics and Toxicology;

(*b*) Surgery including Soundness, Obstetrics and Veterinary Jurisprudence;

(*c*) Animal Husbandry, Part IV, (Genetics and Breeding); and

(*d*) Meat Inspection.

Passing minimum.

32. Candidates shall be declared to have passed the Final Examination if they obtain in each subject not less than one-half of the marks in the written part and not less than one-half of the marks in the practical and oral parts taken together. All the other candidates shall be deemed to have failed in the examination.

Examination by subjects.

33. Candidates who fail in the examination but obtain the prescribed minimum marks for a pass in any subject shall be exempted from re-examination in that subject.

Classification of successful candidates.

34. Candidates who pass the whole examination at their first appearance shall be arranged in two classes—the first consisting of those who have obtained not less than 70 per cent of the aggregate marks and the second consisting of all the others. They shall be arranged in either class in the order of their total marks.

Candidates who pass the whole examination at their first appearance and who obtain not less than 75 per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates who complete the examination by passing subject by subject shall be placed in a separate group in the second class.

Candidates who pass the whole examination at a subsequent appearance shall be ranked only in the second class.

Further study for failed candidates.

35. Candidates who fail in the B.V.Sc. Final Examination or in any subject thereof shall be required to put in an additional course of hospital attendance for a period which shall extend up to the next succeeding examination.

Transitory Regulation.

36. The examination for the B.V.Sc. Degree under the Regulations in force prior to the academic year 1946–47 shall be held till the end of the academic year 1951–52 for the benefit of those candidates who had begun their

courses of study or were undergoing or have undergone their courses of study prior to the year 1946-47 under the above Regulations.

Transitory Provision for G.M.V.C.s

Graduates of the Madras Veterinary College (G.M.V.C.) will be eligible to take the B.V.Sc. Degree of the Madras University, provided they—

(*a*) have passed the Matriculation Examination of this University or an examination recognised by the Syndicate as equivalent thereto;

(*b*) have subsequently undergone a course of study for two academic years in a Veterinary College affiliated to or recognised by the University;

(*c*) have during this period of two academic years passed the B.V.Sc. Intermediate Examination—Part I and Part II; and

(*d*) have passed the B.V.Sc. Final Examination at the termination of two academic years or thereafter.

NOTE.—The above concessions will be granted only to the Diploma holders who took their Diploma prior to the institution of the B.V.Sc. Degree, and the above Regulation will be in force for the duration of the War and five years thereafter.

CHAPTER LXXIV.

Degree of Bachelor of Science in Technology [B.Sc. (Tech.)]

Admission to B. Sc. (Tech.) Examination—conditions of.

1. Candidates for admission to the examination for the Degree of Bachelor of Science in Technology shall be required to have passed the B. A. or B.Sc. Degree Examination of this University or of some other University accepted as equivalent thereto. Candidates offering Branches (a), (b), (d), (f) or (g) shall be required to have passed the B.A. or B.Sc. Degree Examination with Chemistry as Main and Physics as Subsidiary subjects. Candidates offering Branch (c) shall have taken either Physics or Chemistry as Main and the other as Subsidiary subject, while candidates offering Branch (e) shall be required to have taken Chemistry as Main and Botany as Subsidiary subjects. All such candidates shall have taken Mathematics as one of the optional subjects under Part III of the Intermediate Examination. The prescribed course shall be undergone in a College of Technology of the University for a period of not less than two academic years.

2. The course of instruction shall cover any one of the following Branches of study:—

Branches of Study.

(*a*) Chemical Engineering
(*b*) Textile Chemistry
(*c*) Textile Technology
(*d*) Leather Technology
(*e*) Pharmaceuticals and Fine Chemicals
(*f*) Electro-Chemistry
(*g*) Industrial Fermentation

3. Every candidate appearing for the examination shall produce certificates—

Certificates of Attendance, etc.

(a) of having attended at least 80 per cent of the lectures and practical classes;

(b) of having satisfied a test conducted by the Department;

and

(c) of his progress and conduct having been satisfactory.

4. The examination for the Degree shall be both written and practical. The scheme of examination shall be as follows:—

Scheme of Examination.

(a) Chemical Engineering.

PART I.

	Group A.	*Hours.*	*Marks.*
*(1)	German	2	50
*(2)	Practical Mathematics ...	3	50
*(3)	Applied Physical Chemistry I ...	3	100
(4-A)	Industrial Geology ...	3	100
	Group B.		
(5)	General Engineering I—(A) Engineering Materials and Construction of Works; (B) Fuel Technology.	3	100
*(6)	General Engineering II—(A) Power Generation and Transmission; (B) Electrical Plants and Machinery	3	100
*(7)	General Chemical Engineering	3	100
*(8)	Drawing I ...	3	100
	Group C.		
Practical Tests:—			
(i)	Industrial Chemical Analysis...	6	80
	Class Records ...	...	20
(ii)	Electrical Engineering Laboratory ...	3	50
	Mechanical Engineering Laboratory ...	3	50
	Workshop ...	3	50
	Engineering Records ...		50
	Total ...		1,000

*Common Papers.

PART II.

Group A.	Hours.	Marks.
*(9) General Chemical Technology ...	3	100
*(10) Industrial Organisation and Economics ...	3	100
(11) Chemical Engineering I ...	3	100
(12) Chemical Engineering II ...	3	100
Group B.		
(13) Chemical Engineering III ...	3	100
(14) Chemical Engineering IV ...	3	100
(15) Drawing II ...	3	100
(16) Design of full Chemical Plant (Dissertation)		100
Group C.		
Pratical and Viva Voce:—		
Chemical Engineering I ...	6	100
Chemical Engineering II ...	6	100
Chemical Engineering III ...	6	100
General Chemical Technology ...	6	100
Class Records — Chemical Engineering Record 50, Chemical Technology Record 25, Drawing II (Class Work) 25		100
Viva Voce Examination ...		100
Total ...		1,400

(c) Textile Technology.

PART I.

Group A.

(2-A) Theory of Machines and Textile Mechanics ...	3	100

*Common Papers.

	Hours.	Marks.
*(5) General Engineering I—(A) Engineering Materials and Construction of Works ...	$1\frac{1}{2}$	50
*(6) General Engineering II–(A) Power Generation and Transmission; (B) Electrical Plants and Machinery ...	3	100
*(8) Drawing I ...	3	100

Group B.

(4-C) General Textile Chemistry I ...	3	100
(17) Preparation and Spinning I ...	3	100
(18) Preparation and Weaving I ...	3	100
(19) Fabric Structure and Designing I	3	100
(20) General Textile Technology ...	3	100

Group C.

Practical Tests—

(1) Preparation and Spinning I ...	3		100
(2) Preparation and Weaving I ...	3		100
(3) Textile Testing ...	3		100
(4) (*a*) Electrical Engineering Laboratory ...	3	50	200
(*b*) Mechanical Engineering Laboratory ...	3	50	
(*c*) Workshop ...	3	50	
(*d*) Engineering Records		50	
Total ...			1,350

PART II.

Group A.

*(10) Industrial Organization and Economics ...	3	100
(21) Preparation and Spinning II ...	3	100

* Common Papers.

		Hours.	Marks.
(22) Preparation and Weaving II	...	3	100
(23) Fabric Structure and Designing II	...	3	100
(24) General Textile Chemistry II	...	3	100
(25) Cloth Analysis and Costing of Yarn and Cloth		3	100
(26) Textile Engineering	...	3	100
(26-A) Drawing II	...	3	100
(27) Cotton Industry and Trade	...	3	100

Group B.

Practical Tests—

(1) Preparation and Spinning II	...	3	100
(2) Preparation and Weaving II	...	3	100
(3) General Textile Chemistry	...	3	100
(4) Textile Designing	...	3	100
(5) Cloth Analysis and Testing	...	3	100
(6) Class Records	...	3	100
Total	...		1,500

(d) Leather Technology.

PART I.

Group A.

*(1) German	...	2	50
*(2) Practical Mathematics	...	3	50
*(3) Applied Physical Chemistry I	...	3	100
*(4-B) Industrial Organic Chemistry	...	3	100
*(6) General Engineering II	...	3	100
*(7) General Chemical Engineering	...	3	100
*(8) Drawing I	...	3	100

Group B

(28) Introductory Leather Manufacture	...	3	100
(29) Chemistry of Leather Manufacture I		3	100

* Common Papers.

Group C.

Practical Tests:—	*Hours.*	*Marks.*
(i) Industrial Chemical Analysis ...	6	175
Laboratory Records ...		25
(ii) Leather Training Practical ...	3	100
Total ...		1,100

PART II.

Group A.

*(9) General Chemical Technology ...	3	100
*(10) Industrial Organisation and Economics ...	3	100
(30) Chemistry of Leather Manufacture II	3	100
(31) Chemistry of Leather Manufacture III	3	100

Group B.

(32) Organisation and Economics of Leather Manufacture ...	3	100
(33) Processes of Leather Manufacture I ...	3	100
(34) Processes of Leather Manufacture II ...	3	100
(35) Analytical Chemistry of Leather Manufacture ...	3	100

Group C.

Practical Tests:—	*Days.*	*Marks.*
Analyses of Materials and Products of Leather Manufacture ...	3	300
Dyeing and Finishing of Leather ...	1	100
Leather Tanning ...	1	100
Laboratory Records ...		50
Tannery Records ...		50
Total ...		1,400

* Common Papers.

(The scheme of examination for the other Branches (*b*) Textile Chemistry, (*e*) Pharmaceuticals and Fine Chemicals, (*f*) Electro-Chemistry, and (*g*) Industrial Fermentation will be prescribed later.)

Each candidate shall submit to the Examiners concerned his laboratory note-books containing the records of practical work performed during the period of his study, countersigned by the Professor or Head of the Department, on the first day of the Practical Examination.

Examination.

5. Candidates may present themselves for Part I of the examination at the end of the first year of the course and for Part II at the end of the second year of the course. Candidates may sit for Part II only after passing Part I, subject to the provision in Regulation 7 *infra*.

B. Sc. (Tech.) Examinations in Parts I and II shall be held only once a year.

Percentage of marks required for a pass.

6. A candidate shall be declared to have passed Part I of the examination, if he obtains not less than 35 per cent in each of the papers of Group A, not less than 40 per cent in each of the papers (written and practical) of Groups B and C, and not less than 40 per cent of the aggregate marks, provided, however, that a candidate appearing for Textile Technology shall be declared to have passed Part I of the examination, if he obtains not less than 35 per cent in each of the papers of Group A and 35 per cent in the total (of ·200 marks) for the Practical Tests (and Records) in Engineering, not less than 40 per cent in each of the other papers (written and practical) of Groups B and C, and not less than 40 per cent of the aggregate marks.

A candidate shall be declared to have passed Part II of the examination, if he obtains not less than 40 per cent in each of the papers (written and practical) and not less than 50 per cent of the aggregate marks.

7. A candidate who obtains not less than 40 per cent of the aggregate marks in Part I and not less than 50 per cent of the aggregate marks in Part II, but fails in not more than two subjects only in Part I or Part II (written or

practical) shall be exempted from re-appearing in the subjects in which he has passed, and such a candidate shall be permitted to appear in those subjects at a subsequent appearance without any additional attendance.

Other candidates who fail in Part I or Part II shall be required to put in additional attendance before appearing for the examination again.

Classification of successful candidates.

8. Candidates who pass in Parts I and II of the examination on the first occasion of appearing therefor, shall be ranked in the order of proficiency as determined by the total marks obtained by each in both Parts, and shall be arranged in two classes, the First consisting of those who have obtained not less than sixty per cent of the aggregate marks, and the Second consisting of all the others. Candidates securing not less than seventy-five per cent of the aggregate marks shall be declared to have passed in the First Class with Honours. Those who complete or pass the examination at subsequent appearances will be placed in the Second Class separately.

Practical Course.

9. Every candidate shall put in a practical course of three months in the case of Chemical Engineering, and not less than six months in the case of Leather and Textiles, in an approved Mill or Factory, before supplicating for the Degree.

Home Paper for Chemical Engineering Branch.

10. Each student in Branch (*a*) Chemical Engineering shall be required to work on the design of a prescribed Chemical Manufacturing Plant and/or write a critical report on a special technical subject. A period of nearly three months will be allowed for answering these questions and they should be submitted by the 1st April of each year marked outside "Home Paper" and bearing the candidate's name.

These questions shall be set by the Professor of Chemical Engineering, and in consultation with the Chairman of the Board of Examiners, not less than three months before the Final Examination.

Transitory Regulation.

11. Candidates who fail in Part I or II of the examination under the Old Regulations shall be required to put in additional attendance for one academic year, and permitted to sit for Part I or II of the examination, as the case may be, under the New Regulations. Those who fail in one or two subjects in Part I or II of the examination under the Old Regulations shall be required to take the corresponding paper under the New Regulations without any additional attendance.

CHAPTER LXXV.

Degree of Bachelor of Commerce (B.Com.)

Admission to B.Com. Degree —conditions.

1. Candidates for the Degree of Bachelor of Commerce (B.Com.) shall be required—

(i) to have passed the Intermediate Examination of this University or an examination of some other University recognised by the Syndicate as equivalent thereto; and

(ii) to have undergone subsequently a prescribed course of study extending over a period of not less than two academic years in a college recognised by or affiliated to the University in Commerce.

Course of Study.

2. The course of study shall comprise instruction in the following subjects according to syllabuses and text-books to be prescribed from time to time:—

PART I.

The course shall last for a period of one academic year.
English [Same as B.Sc. (Pass) Degree—Part I—English].

PART II.

A Second Language.

The course shall last for a period of one academic year and shall comprise the study of any one of the following languages, at the option of the candidate:—

Modern	(1) *Foreign*	French	German
	(2) *Indian*	Tamil	Oriya
		Telugu	Hindi
		Kannada	Bengali
		Malayalam	Burmese
		Urdu	Sinhalese
		Marathi	

(*Note*: The language taken shall not be the same as that taken for the Intermediate Examination.)

The course shall be (1) Translation from the selected language into English and *vice versa*, and (2) Composition which shall be in the nature of short letters dealing with Commercial Correspondence.

(*Note*: No text-books will be prescribed.)

PART III.

The course shall last for a period of two academic years, and shall comprise the study of:—

1. *Economics—General.
2. Banking, Theory and Practice.
3. Mercantile Law.
4. Business Organisation and Commercial Geography.
5. Accountancy.
6. Auditing.
7. Precis Writing and Business Correspondence.
8. Any one of the following subjects:—
    - (*a*) Transport.
    - (*b*) Insurance.
    - (*c*) Co-operation.
    - (*d*) Statistical Methods and their application to Commerce.

(*Note*: For Syllabuses *vide* Appendix XXIV.)

Examination. 3. The examination shall be in three Parts, Part I, Part II and Part III. Candidates may take Part I of the examination at the end of the first year of the course and Parts II and III at the end of the second year.

Scheme of Examination. 4. The scheme of examination shall be as follows:—

PART I.		*Hours.*	*Marks.*
1.	† English—Prose ...	3	100
2.	† English—Composition ...	3	100
	Total ...		200

[*In common with B.A., Part III—Groups (iv-a), (iv-b), (iv-c) and (iv-d).]

(† The papers in English shall be the same as for Part I—English—of the B.Sc. (Pass) Degree Examination.)

C—16

PART II

A Second Language.		*Hours.*	*Marks.*
Composition and Translation	...	3	100

PART III.

			Hours.	*Marks.*
1.	‡ Economics—General	...	3	100
2.	Banking, Theory and Practice	...	3	100
3.	Mercantile Law	...	3	100
4.	Business Organisation and Commercial Geography	...	3	100
5.	Accountancy	...	3	100
6.	Auditing	...	3	100
7.	Precis Writing and Business Correspondence	...	3	100
8.	Optional Subject	...	3	100
		Total	...	800

Marks required for a pass in the several Parts to qualify for the Degree.

5. A candidate shall be declared to have passed Part I of the examination if he obtains not less than 35 per cent of the total marks in English. A candidate shall be declared to have passed Part II of the examination if he obtains not less than 35 per cent of the marks in the selected language in Part II. A candidate shall be declared to have passed Part III if he obtains not less than 30 per cent of the marks in each of the subjects under Part III and not less than 35 per cent of the total marks in that Part.

Conditions of eligibility for the Degree.

6. No candidate shall be eligible for the Degree of Bachelor of Commerce until he has completed the course of study prescribed and passed the examination in all the Parts specified in Regulations 2 and 5 *supra.*

‡ (The question paper shall be the same as for B.A., Part III—Groups (iv-a), (iv-b), (iv-c) and (iv-d)—"Economics—General".)

Classification of successful candidates.

7. There shall be separate lists of the successful candidates in each Part. Candidates obtaining not less than 60 per cent of the total marks in Part I or Part II shall be declared to have passed that Part with distinction.

Successful candidates who obtain not less than 60 per cent of the marks in Part III shall be placed in the first class. Successful candidates who obtain less than 60 per cent and not less than 50 per cent of the marks shall be placed in the second class. All the other successful candidates obtaining less than 50 per cent of the marks shall be placed in the third class.

Exemption in certain papers.

8. A candidate for the B. Com. Degree who has already passed Part I of the Bachelor of Arts Degree Examination (Pass or Honours) or Part I, with English, of the Bachelor of Science Degree Examination (Pass or Honours) of this University, shall have the option of being exempted from examination in the English portion of Part I.

A candidate who has already qualified for the B.A. Degree of this University in Group (iv-a), (iv-b), (iv-c) or (iv-d) or for the B.A. (Honours) Degree of this University in Branch III, IV, V or XIII shall have the option of being exempted from examination in "Economics—General" under Part III.

Such a candidate shall, however, pay the prescribed fee for the Part or Parts of the examination, as the case may be.

The candidates who avail themselves of the above exemption or exemptions shall not be eligible for any prize or medal awarded by the University, and successful candidates under this category shall be placed in a separate list.

Failed candidates.

9. Candidates who fail in any Part or Parts of the examination shall be permitted to appear in such Part or Parts at any subsequent examination on payment of the prescribed fees and need not produce any additional certificate of attendance and progress.

Successful candidates under the above Regulation shall be placed in a separate list. They shall not be eligible for prizes or medals awarded by the University.

10. Candidates who have passed Part I of the B. Com. Degree Examination prior to March 1948 shall be exempted from examination in the paper on "Precis Writing and Business Correspondence" under Part III of the B. Com. Degree Examination.

Candidates who have failed in Part I of the B. Com. Degree Examination in or prior to September 1947 but have passed in Part III will be permitted to take the examination in Part I under the Old Regulations, provided that :—

(1) the last examination under the Old Regulations shall be in September 1950, and

(2) candidates who have not passed Part I in or prior to September 1950 shall take the examinations in Part I under the New Regulations as well as in Precis Writing and Business Correspondence in Part III under the New Regulations.

CHAPTER LXXVI.

Degree of Bachelor of Commerce (Honours).

1. Candidates for the Examination of Bachelor of Commerce (Honours) Degree shall be required:

either

A

Admission to B. Com. (Hons.) Degree—conditions.

(1) to have passed the Intermediate Examination in Arts and Science of this University or an examination of some other University recognised by the Syndicate as equivalent thereto, and

(2) to have undergone subsequently a further course of study in a college recognised by or affiliated to the University in Commerce for a period of not less than three academic years or nine terms;

or

B

(1) to have qualified for the Degree of Bachelor of Commerce of this University or to have passed an examination of some other University recognised by the Syndicate as equivalent thereto, and

(2) to have undergone subsequently a further course of study in a college recognised by or affiliated to the University in Commerce for a period of not less than two academic years or six terms.

Course of Study.

2. The course of study shall comprise instruction in the following subjects according to syllabuses and text-books prescribed from time to time:—

Part I—Preliminary Examination.

English to be studied during the first year of the course. The candidates may take Part I of the Examination at the end of the first year of the course :—

(1) English Composition (including certain books prescribed for perusal). [Same as for B.A. (Honours) Preliminary.]

(2) Precis Writing and Business Correspondence.

Part II—Final Examination.

The following are the subjects to be studied during the course prescribed. The candidates may take the Final Examination at the end of the third year of the course :—

(1) *General Economics.
(2) Rural Economics.
(3) History and Principles of Co-operation and Co-operative Laws.
(4) Mercantile Law.
(5) Banking.
(6) Accountancy.
(7) Auditing—General and Co-operative.
(8) Business Organisation.

Practical Training.

The Practical Training shall be conducted in such institutions as may be approved by the Syndicate, such as, Agricultural Co-operative Credit Societies, and Non-Credit Societies. The candidates shall undergo practical training on one day in the week for eight academic terms and in addition for a period of three months either at the end of the second year or at the beginning of the third year of the course.

Scheme of Examination.

3. The scheme of examination shall be as follows :—

Part I—Preliminary Examination.

There shall be two papers of three hours' duration each.

	Hours.	*Marks.*
(1) English Composition (Same as for B.A. (Honours) Preliminary) ...	3	100
(2) Precis Writing and Business Correspondence ...	3	100
Total ...		200

*In common with B.A. (Honours) Degree Examination—Branches III, V and XIII.

Part II—Final Examination.

	Hours.	Marks.
(1) General Economics (Same as for B. A. (Honours) Final) ...	3	175
(2) Rural Economics ...	3	175
(3) History and Principles of Co-operation and Co-operative Laws ...	3	175
(4) Mercantile Law ...	3	175
(5) Banking ...	3	175
(6) Accountancy ...	3	175
(7) Auditing—General and Co-operative.	3	175
(8) Business Organisation ...	3	175
Total ...		1,400

Permitted to sit for Honours Examination only once—Provision for withdrawal.

4. No candidate shall be permitted to undergo the complete Final Examination in Honours more than once. A candidate for the Final Examination shall be permitted to withdraw from the examination, provided that he has not sat for the last paper in the examination, and provided that he has given notice of withdrawal to the Registrar within three clear days from the date of the last paper which he answered. He shall be permitted to appear again for the Final Examination in the following year without producing any additional certificate of attendance.

Note:—A candidate shall be deemed to have sat for the last paper if he has entered the hall in which the examination for the last paper is held.

5. A candidate for the B. Com. (Honours) Degree shall be required to appear for the Final Examination in Honours—

Time Limit for appearance for Final Examination.

(1) not later than the end of the fourth year after commencing the Honours Degree Course in a college;

or

(2) in the case of a Bachelor of Commerce proceeding to the Honours Degree Examination, not later than

three years after commencing the Honours Degree Course in a college.

Part I to be passed before admission to the Final Examination.

6. No candidate shall be admitted to the Final Examination (Part II) in Honours unless he has passed the Preliminary Examination (Part I).

Eligibility for the Degree.

7. No candidate shall be eligible for the B. Com. (Honours) Degree until he has passed the Preliminary Examination (Part I) and the Final Examination (Part II).

Marks qualifying for a pass in Part I.

8. *Part I—Preliminary Examination.*—A candidate who secures not less than 40 per cent of the aggregate marks in the two papers in Part I shall be declared to have passed the Examination in Part I—Preliminary Examination.

A candidate who secures not less than 60 per cent of the aggregate marks shall be declared to have passed the examination with distinction.

Marks qualifying for a pass in Part II, and divisions of subjects

9. *Part II—Final Examination.*—A candidate shall be declared to have passed the examination for the B. Com. (Honours) Degree if he obtains not less than 40 per cent of the total marks and not less than 30 per cent in each division of the examination. All the other candidates shall be deemed to have failed in the examination for Honours. The divisions shall be as follows:—

(*a*) General Economics and Rural Economics.

(*b*) History and Principles of Co-operation and Co-operative Laws, and Business Organisation.

(*c*) Mercantile Law and Banking.

(*d*) Accountancy and Auditing—General and Co-operative.

Classification of successful candidates.

10. Successful candidates in the examination shall be ranked in the order of proficiency as determined by the total marks obtained by each and shall be arranged in three classes:—

Candidates who obtain not less than sixty per cent of the aggregate marks shall be placed in the first class; those

who obtain less than sixty per cent but not less than fifty per cent shall be placed in the second class; and all the other successful candidates shall be placed in the third class.

Candidates for Honours recommended for B.Com. Degree—when and how.

11. In the event of a candidate for the B. Com. (Honours) Degree failing to satisfy the Examiners, he may be recommended by them for the B. Com. Degree, provided that he obtains not less than $33\frac{1}{3}$ per cent of the total marks and not less than 25 per cent in each division of the examination.

Failed or withdrawn candidates from Honours Examination to appear for B.Com.

12. (1) A candidate not already eligible for the B. Com. Degree, who, having failed completely in the B. Com. (Honours) Degree Examination, desires to appear for the B.Com. Degree Examination shall be allowed to do so without the production of a further certificate of attendance in a college recognised by or affiliated to the University in Commerce.

(2) A candidate not already eligible for the B. Com. Degree, who, after being registered, presents himself for the B. Com. (Honours) Degree Examination in any year and withdraws from the same and is prevented, through illness or otherwise, from subsequently presenting himself for examination within the period specified, shall be allowed to appear for the B. Com. Degree Examination without the production of a further certificate of attendance in a college recognised by or affiliated to the University in Commerce.

Candidates appearing under this Regulation for the B. Com. Degree Examination shall appear for all the parts of the examination, and shall take under Part III—Co-operation as the optional subject.

CHAPTER LXXVII.

Diploma Courses.

(1) *Diploma in Economics.*

Eligibility for Diploma.

1. No candidate shall be eligible for the Diploma in Economics unless he has completed the prescribed course of study and has satisfied the examiners in the qualifying examination.

Course of Study.

2. The course of study shall be:—

1. Economics.
2. Statistical Methods.
3. Recent Economic History and Economic Geography.
4. Rural Economics.
5. Social Economics (including Elements of Social Institutions).
6. A special subject in 4 or 5.

Every candidate shall also submit before 1st July a short thesis based on original enquiry on some problem of limited scope connected with either 4 or 5.

Qualification for admission.

3. The course of study shall be open only to students who have qualified for a degree in this University or other recognised Universities.

Applications.

4. Applications to enter upon the course of study must reach the Professor of Indian Economics not later than the 15th June of each year.

Duration of Course.

5. The course for the Diploma in Economics shall be normally for one year, but for part-time students it shall extend over two years.

Attendance.

6. No student shall be admitted to the examination unless he or she has attended not less than three-fourths of the lectures and classes provided, and also produces the prescribed certificate.

Fee.

7. A fee of Rs. 100 shall be paid to the University by each student on admission to the course, except in the case of part-time students who may pay the fee in two annual instalments of Rs. 50.

Classification of successful candidates.

8. A candidate shall be declared to have passed the examination if he obtains not less than forty per cent of the total marks in all the papers taken together. All the other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent of the marks shall be declared to have passed with distinction.

Syndicate competent to suspend course and examination.

9. Notwithstanding anything contained in the foregoing Regulations, it shall be competent for the Syndicate, by previous notice in the *Fort St. George Gazette*, to suspend for any year or any number of years the courses and examinations for the Diploma in Economics, provided always that any student permitted to enter upon the courses, who qualified for the certificate prescribed in Regulation 6, shall be permitted to present himself for examination in accordance with the Regulations at the earliest opportunity at which he would have been entitled to appear but for suspensory notice.

(2) *Diploma in Politics and Public Administration.*

Eligibility for Diploma.

10. No candidate shall be eligible for the Diploma in Politics and Public Administration unless he has completed the prescribed course of study and has satisfied the examiners in the qualifying examination.

Course of Study.

11. The course of study shall comprise the following subjects :—

*1. Politics.

2. Public Administration—Principles and Practice.

3. History of Administration in India and the Machinery of the Government of India (Central, Provincial and Local).

*4. Economics.

*The syllabuses in the subjects with asterisk will be the same as for the Groups (iv-a) and (iv-b) of the B.A. (Pass) Degree Course. In other subjects, syllabuses will be prescribed from time to time.

5. Public Finance.
6. One of the following optionals in Law:—
    Law of Contract.
    Indian Penal Code.
    Land Tenures.
    Indian Constitutional Law.
7. One of the following optionals in Commerce:—
    Business Organisation.
    Accounts and Cost Accounting.

Qualification for admission.

12. Admission to the course of study shall be open to persons who have passed the Intermediate Examination in Arts and Science of this University or an examination of some other University accepted by the Syndicate as equivalent thereto, and such others as may be considered fit to undergo the course, by the Syndicate, and have been certified as such by the Head of the Department.

Applications.

13. Applications to enter upon the course of study must reach the Registrar not later than the 15th June of each year, in the prescribed form obtainable at the Office of the Registrar.

Duration of Course.

14. The course shall be a part-time one extending over two academic years or six terms.

Provided, however, that a student who has already qualified for the B.A. (Honours) or M.A. Degree of this University with History or Economics or Politics shall be exempted from undergoing the course for one academic year, and from being examined in any three of the following papers taken by him for the Degree:—

† Politics
Public Administration.
Economics.
Public Finance.

A student who has already passed the B.L. Degree Examination of this University shall be exempted from the

†NOTE.—In the case of those who have qualified for the B. A. (Honours) Degree in Politics, 'Politics' will include the three compulsory papers in Politics.

course and examination in the Optional Subject in Law, but such a student shall be required to undergo the prescribed course of two academic years or six terms.

Such candidates shall, however, pay the prescribed fee for the whole examination.

Attendance. 15. No student shall be admitted to the examination unless he has attended not less than 75 per cent of the total attendance at lectures and has produced a certificate from the Head of the Department certifying that his progress and conduct have been satisfactory.

Scheme of Examination. 16. The scheme of examination shall be as follows:—

	Hours.	*Marks.*
1. Politics	3	100
2. Public Administration ...	3	100
3. History of Administration, etc.	3	100
4. Economics	3	100
5. Public Finance	3	100
6. Optional Subject (Law) ...	3	100
7. Optional Subject (Commerce) ...	3	100
Total ...		700

Passing marks, and classification of successful candidates. 17. A candidate shall be declared to have passed the examination if he obtains not less than 30 per cent in each of the following groups:—

(*a*) Politics,
Public Administration,
History of Administration in India and the Machinery of the Government of India (Central, Provincial and Local), and
Optional Subject (Law);

(*b*) Economics,
Public Finance, and
Optional Subject (Commerce);

and not less than 40 per cent of the total marks in all the papers taken together. All the other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent of the marks shall be declared to have passed with distinction.

Candidates under the proviso to Regulation 14 *supra* shall be declared to have passed the examination if they obtain not less than 30 per cent of the marks in the papers taken by them under each group, and not less than 40 per cent of the marks in the aggregate of the papers taken by them.

Successful candidates under this category shall be arranged in a separate list.

Syndicate competent to suspend course and examination.

18. Notwithstanding anything contained in the above Regulations, it shall be competent for the Syndicate, by previous notice in the *Fort St. George Gazette*, to suspend for any year or any number of years the course and examination for the Diploma in Politics and Public Administration.

(3) *Diploma in Co-operation.*

Eligibility for Diploma.

19. No candidate shall be eligible for the Diploma in Co-operation unless he has completed the prescribed course of study and has satisfied the examiners in the qualifying examination.

Course of Study.

20. The course of study shall be:—

(i) Economics: (*a*) Agricultural Organisation and (*b*) Industrial and Commercial Organisation.

(ii) Co-operation—History and Principles.

(iii) ,, —Law and Practice.

(iv) Banking—Law and Practice.

(v) Accountancy.

(vi) Auditing.

Practical Training.

21. Every candidate shall also undergo practical training for three months under the direction of the Registrar of Co-operative Societies in institutions recommended by him and shall be examined with special

reference to his practical knowledge in one of the following subjects:—

(a) Co-operative Banking; (b) Land Mortgage Banking; (c) Stores; (d) Marketing.

Qualification for admission.

22. Admission to the course shall be open to persons who have passed the B. A. or B. A. (Honours) Degree Examination in History or Economics of this University or an examination of some other University recognised by the Syndicate as equivalent thereto, and such others who, after passing the Intermediate Examination, are engaged in co-operative service, whether Government or private, for a period of not less than two years.

Duration of Course.

23. The course for the Diploma in Co-operation shall be a full-time course extending over one academic year.

Attendance.

24. No student shall be admitted to the examination unless he has attended not less than three-fourths of the lectures and classes provided, and has undergone the practical training prescribed, and also produces the prescribed certificate.

Scheme of Examination.

25. The scheme of examination shall be as follows:—

	Hours.	*Marks.*
(1) Economics—Agricultural Organisation and Industrial and Commercial Organisation ...	3	100
(2) Co-operation I—History and Principles	3	100
(3) Co-operation II—Law and Practice	3	100
(4) Banking—Law and Practice ...	3	100
(5) Accountancy ...	3	100
(6) Auditing ...	3	100
(7) Practical Examination ...	3	100
Total ...		700

Passing marks and classification of successful candidates.

26. A candidate shall be declared to have passed the examination if he obtains not less than 40 per cent of the total marks in all the papers taken together, and not less than 30 per cent in each of the papers. All the other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent of the marks shall be declared to have passed with distinction.

(4) *Diploma in Statistics.*

Eligibility for Diploma.

27. No candidate shall be eligible for the Diploma in Statistics unless he has completed the prescribed course of study and has satisfied the examiners in the qualifying examination.

Course of Study.

28. The course of study shall comprise the following subjects:—

(1) Mathematics. (Those who have taken Mathematics, either as main or as subsidiary subject, for a degree course will be exempted from this paper).

(2) Economics. (Those who have taken Economics for a degree course will be exempted from this paper).

(3) Statistical Methods.

(4) Applied Statistics.

(5) & (6) Two of the following subjects:—

Actuarial Statistics.

Economic Statistics.

Mathematical Economics and Econometrics.

Vital Statistics and Population Problems.

Agricultural Statistics (including Design of Experiments).

(7) Practical Examination.

Qualification for admission.

29. The course of study shall be open only to students who have qualified for a degree in this University or other recognised Universities.

Applications.

30. Applications for admission to the course must reach the Registrar not later than the 15th June of each year, in the prescribed form obtainable at the Office of the Registrar.

Duration of Course.

31. The course shall be a part-time one extending over two academic years or six terms.

Attendance.

32. No student shall be admitted to the examination unless he has attended not less than 75 per cent of the total attendance at lectures and has produced a certificate from the Head of the Department certifying that his progress and conduct have been satisfactory:

Provided, however, it shall be competent for the Syndicate to permit any student who has already passed the Diploma Examination in Statistics to appear in a further Special Subject on production of the prescribed attendance certificates in that subject and on payment of the prescribed fee.

A candidate coming under this proviso shall not be admitted to the Diploma at a Special Meeting of the Senate a second time, but a special certificate setting forth the further subjects of the examination passed by him and the date of such examination shall be given to him.

Scheme of Examination.

33. The scheme of examination shall be as follows:—

		Hours.	*Marks.*
Mathematics	...	3	100
Economics	...	3	100
Statistical Methods	...	3	100
Applied Statistics	...	3	100
Special Subject I	...	3	100

		Hours.	Marks.
Special Subject II	...	3	100
Practical Examination	...	3	75
Practical Note-book	...		25
Total	...		700

At the Practical Examination candidates must submit to the Examiner or Examiners their laboratory note-books duly certified by their Professors or Lecturers, as *bona fide* record of work done by the candidates.

Passing marks, and classification of successful candidates.

34. A candidate shall be declared to have passed the examination if he obtains not less than 30 per cent of the marks in each paper, and 40 per cent in the aggregate; in the case of a candidate who has been exempted from (1) Mathematics, or (2) Economics, the aggregate shall be of the papers excluding the paper in which he has been exempted. Successful candidates obtaining not less than 60 per cent of the marks shall be declared to have passed with distinction.

Candidates appearing under the proviso to Regulation 32 *supra* shall be deemed to have passed the examination if they obtain 40 per cent of the marks in the new Special Subject.

Syndicate competent to suspend course and examination.

35. Notwithstanding anything contained in the above Regulations, it shall be competent for the Syndicate, by previous notice in the *Fort St. George Gazette*, to suspend for any year or any number of years the course and examination for the Diploma in Statistics.

(5) *Certificates or Diplomas in French and German.*

Eligibility for Certificate or Diploma.

36. No candidate shall be eligible for the Certificate or Diploma in French or German who has not undergone the prescribed course and satisfied the examiners in the qualifying examinations.

Qualification for admission.

37. No candidate shall be admitted to the courses of instruction in French and German who has not passed the examination for Certificates of Proficiency in Oriental Learning or the Matriculation examination of this University or an examination recognised by the Syndicate as equivalent thereto.

Course—for whom intended.

38. The course, which is a part-time course, is primarily intended for such persons as are desirous of proceeding overseas for higher studies, but shall be open to the other persons approved by the Syndicate provided they have satisfied the condition laid down in Law 37 of this Chapter.

Duration of Course.

39. The course for the Certificate and the Diploma shall be as follows:—(1) Certificate course extending over one academic year or three terms, and (2) Diploma Course extending over two academic years or six terms. The course may be conducted by the University itself or a college recognised by or affiliated to this University.

Applications.

40. Applications for admission to the course conducted by the University must reach the Registrar not later than the 15th June.

41. For the purpose of entrance to the course no previous acquaintance with the language is required and the candidates will be taught on a syllabus and text-books prescribed from year to year.

Date of examination.

42. There shall be an examination held yearly in the first week of July or on such other dates as may be fixed by the Syndicate.

Attendance.

43. No student shall be admitted to the examination for the Certificate in French or German unless he has attended not less than 75 per cent of the total attendances at lectures and has produced a certificate from the Lecturer certifying that his progress and conduct have been satisfactory. The examination shall consist of two papers, the first of three hours' and the second of two hours' duration.

The first paper shall contain questions on text-books and grammar, and the second paper shall contain questions on translation from the selected language (unseen passages) into English and *vice versa*.

Examination.

No student shall be admitted to the examination for the Diploma in French or German unless he has passed the examination for the Certificate in French or German of this University, and has attended not less than 75 per cent of the total attendances at lectures and has produced a certificate from the Lecturer certifying that his progress and conduct have been satisfactory. The examination shall consist of two papers of three hours' duration each. The first paper shall contain questions on the prescribed text-books and grammar, and the second paper shall contain questions on translation from the selected language (unseen passages) into English, and on composition in the selected language. There shall also be a *viva voce* examination.

Passing marks, and classification of successful candidates.

44. A candidate shall be declared to have passed the examination if he obtains not less than forty per cent of the total marks in all the papers taken together. All the other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than sixty per cent of the marks shall be declared to have passed with distinction.

Fee.

45. The fee for the Certificate Course (first year course) in either French or German shall be Rs. 60 and the fee for the Diploma Course (second year course) in either French or German shall be Rs. 60, payable to the University on admission to the course, provided that in the case of students reading for the Honours Degree Examination in Arts and Science, other Degree Examinations (including Professional Degree Examinations), or the Diploma Examinations in Economics and Geography, and students in the Bachelor of Engineering class who have still to complete their practical course, preference being given to students reading for Honours, a concession fee which may be fixed by the Syndicate shall be levied; and provided the number of students admitted at the reduced rate in any particular year shall not exceed 50 per cent of the total admissions in each language in that year.

46. Candidates who have already qualified for the Diploma in French or German under the Regulations in force prior to the year 1945-46, and desire to undergo the second year course in the same language, shall be permitted to do so on payment of the prescribed fee, and shall be given a certificate—without being required to sit for an examination—stating that they have undergone a two years' course at the University in their selected language, provided they have put in 75 per cent of the attendances.

Syndicate competent to suspend course and examination.

47. Notwithstanding anything contained in this Chapter, it shall be competent for the Syndicate, by previous notice in the *Fort St. George Gazette*, to suspend for any year or any number of years the course and examination for the Diploma in French or German.

(6) *Diploma in Librarianship.*

Eligibility for Diploma.

48. No candidate shall be eligible for the Diploma in Librarianship unless he has taken a degree in this University or a degree in some other University accepted as equivalent thereto by the Syndicate and has completed the prescribed course of study and has satisfied the examiners in the qualifying examination.

Duration of Course.

49. The course for the Diploma in Librarianship shall be a full-time course and shall extend normally over a period of one academic year—July to March.

Course of Study.

The course shall ordinarily consist of lectures and practical work and comprise the study of the following:—

PART I.

Theory.—

1. Bibliography.
2. Book Selection.
3. Library Organisation.
4. Library Administration.
5. Classification.

6. Cataloguing.

7. Reference Work.

(For Syllabus *vide* **Appendix XXVI**.)

PART II.

Practical.—

1. Book Selection.
2. Classification by the Colon and Dewey Schemes.
3. Cataloguing by the Cataloguing Rules of the Madras University Library.
4. Work in an approved Library for one term.

50. No candidate shall be admitted to the course unless he has qualified for a degree in this University or a degree in some other University accepted as equivalent thereto by the Syndicate.

Applications.

51. Applications for admission to the course must be submitted to the Registrar so as to reach him not later than the 15th June of each year, in the prescribed form obtainable at the Office of the Registrar.

Fee.

52. The fee for the course shall be Rs. 60 which shall be paid by every student on admission to the course.

Scheme of Examination.

53. There shall be an examination—both written and practical—at the end of the course, and the scheme of examination shall be as follows:—

	Hours.	*Marks.*
Bibliography, Book Selection and Reference Work	3	100
Organisation	3	100
Administration	3	100
Classification	3	100
Cataloguing	3	100

		Hours.	Marks.
Practical Examination:—			
Classification ...	... ...	3	100
Cataloguing ...	... ...	3	100
	Total ...		700

Attendance.

54. No candidate shall be admitted to the examination unless he has attended not less than three-fourths of the lectures and practical classes provided, and has produced the prescribed certificates.

Passing minimum.

55. No candidate shall be declared to have passed the examination unless he has obtained not less than 30 per cent in each Division and not less than 40 per cent in the total.

Divisions.

The divisions shall be as follows:—

Division I—Classification (Written and Practical).

" II—Cataloguing (Written and Practical).

" III—All other subjects, *viz.*, Bibliography, Book Selection, Organisation, Administration, and Reference Work.

56. Successful candidates shall be arranged in three classes:—

Classification of successful candidates.

The first, consisting of those who obtain not less than 30 per cent in each division, and 60 per cent of the total, the second, of those who obtain not less than 30 per cent in each division, and 50 per cent of the total, and the third, of those who obtain not less than 30 per cent in each division, and 40 per cent of the total.

57. A candidate may, at his option, present himself for the whole or for any division or divisions of the examination at any one time. He should, however, pay the fee for the whole examination at his first appearance. Candidates who qualify for the Diploma by passing the examination in divisions shall be ranked in the third class separately.

58. Candidates who fail at an examination may, without putting in any additional attendance at the course, appear for the examination in whole or in divisions in any subsequent year.

59. The Syndicate may, by notification in the *Fort St. George Gazette*, suspend the course for the Diploma in any year if it finds it necessary to do so.

(7) *Diploma in Geography.*

Eligibility for Diploma.

60. No candidate shall be eligible for the Diploma in Geography unless he has completed the prescribed course of study and has passed the qualifying examination.

Qualification for admission.

61. No candidate shall be admitted to the course unless he has qualified for a Degree in Arts or Science of this University or a Degree of any other recognised University accepted as equivalent thereto by the Syndicate.

It shall be competent for the Syndicate to admit persons who have passed the Intermediate Examination with Geography as their optional subject and Teachers in Schools or Colleges within the jurisdiction of this University who can produce evidence of sufficient knowledge of the subject which will enable them to profit by the course.

Applications.

62. Applications for admission to the course must reach the Registrar not later than the 15th June of each year.

Course of Study.

63. The course of study shall be as follows:—

(1) The Physical Basis of Geography, including the elements of Meteorology, Oceanography, and Geomorphology (for Syllabus *vide* **Appendix XXVI**).

(2) General Regional Geography of the World with a special study of the Regional Geography of India and any one of the six continents. (The particular continent will be prescribed from time to time.)

(3) A short course in one of the following:—

(a) Historical Geography.
(b) Political Geography.
(c) Economic Geography.
(d) Bio-Geography.
(e) Anthropo-Geography.

(4) Practical Geography.

Every candidate shall also submit:—

(i) before the 15th May following the written and practical examination a short dissertation on a selected area in India:

or

(ii) before the 1st April in the year of the examination, his Field Work records.

Duration of Course.

64. The course for the Diploma shall be normally one academic year—July to March.

Attendance.

65. No student shall be admitted to the examination unless he has attended not less than three-fourths of the lectures and other classes provided, and has obtained the prescribed progress and attendance certificate.

Fee.

66. The fee for the course shall be Rs. 100 or Rs. 125 in the case of those selecting "Field Work", which shall be paid by every student on admission to the course.

Scheme of Examination.

67. The scheme of examination shall be as follows:—

Part I.		*Hours.*	*Marks.*
Physical Basis of Geography	...	3	100
Practical Geography	...	3	100
Field Work Records *or* Dissertation	...		100
Practical Note-book	...		100
Total	...		400

Part II.	*Hours.*	*Marks.*
Regional Geography of the World ...	3	100
Regional Geography of India ...	3	100
Regional Geography of the Selected Continent ...	3	100
Optional Subject ...	3	100
Total ...		400

Marks qualifying for a pass.

68. Candidates shall be declared to have passed the examination if they obtain not less than 35 per cent of the marks in every paper, and not less than 40 per cent of the marks in each part:

Provided, however, that a candidate who obtains the prescribed minima in any part shall be exempted from re-examination in the subjects included in the part.

69. Successful candidates who obtain not less than 60 per cent of the aggregate marks, and pass in both parts together shall be declared to have passed the examination with distinction.

70. It shall be competent for the Syndicate to suspend the course in any year or for a number of years.

(8) *Diploma in Indian Music.*

Eligibility for Diploma.

71. No candidate shall be eligible for the Diploma in Indian Music who has not undergone the prescribed course and has not passed the qualifying examination.

Qualification for admission.

72. No candidate shall be admitted to the course unless he has been declared eligible for admission to a University course of study or has passed the Matriculation Examination or an examination recognized by the Syndicate as equivalent thereto, and has already received sufficient training in Indian Music to enable him to benefit by the Diploma course:

provided, however, it shall be competent for the Syndicate to admit to the course women students sufficiently

trained in Indian Music who are holders of completed Secondary School-Leaving Certificates, but are not declared eligible for admission to University courses of study.

Course—for whom intended.

73. The course shall be a full-time course primarily intended for such persons as desire to attain high proficiency in Indian Music.

Applications.

74. Applications for admission to the course must be received in the Registrar's Office before the 15th June each year. Applicants may be subjected to a test before selection.

Duration of Course.

75. The course shall extend over a period of two academic years or six terms.

Course of Study.

76. Instruction shall be imparted in the Theory and Practice of Music, Vocal, Violin, Veena, Gotuvadyam and Flute.

The course of study shall be prescribed from time to time. Candidates shall take either Vocal or Instrumental Music (Violin or Veena or Gotuvadyam or Flute) for the practical course.

Attendance.

77. No candidate shall be admitted to the examination unless he has kept not less than three-fourths of the attendances and produced the required certificates of attendance and progress:

Appearance in another subject for practical test.

provided, however, it shall be competent for the Syndicate to permit any student who has already passed the Diploma Examination in Indian Music to offer another subject for the practical test one year after his passing the Diploma Examination on production of the prescribed attendance certificates for one year in that subject, the certificates being earned by attendance either before or subsequent to the first successful appearance at the Diploma Examination and on payment of the prescribed fee.

A candidate coming under this proviso shall not be admitted to the Diploma at a Special Meeting of the Senate a second time, but a special certificate setting

forth the further subject of the examination passed by him and the date of such examination shall be given to him.

Scheme of Examination.

78. The examination shall be both written and practical. There shall be two papers on Theory, each of three hours' duration and two practical tests. At the practical examination candidates shall be expected to sing or play any of the ragas prescribed as well as compositions in any of the talas prescribed.

Marks qualifying for a pass.

79. A candidate shall be declared to have passed the examination if he obtains not less than 35 per cent of the marks in Theory, 45 per cent of the marks in the Practical Examination, and 50 per cent of the marks in the aggregate.

Successful candidates obtaining not less than 60 per cent of the marks in the Practical Examination and 75 per cent of the marks in the aggregate shall be declared to have passed with distinction.

Candidates appearing under the proviso to Regulation 77 *supra* shall be deemed to have passed the examination if they obtain 45 per cent of the marks in the new practical subject.

80. It shall be competent for the Syndicate to suspend the course in any year or for a number of years.

81. Notwithstanding anything contained in the above Regulations, students who have been admitted to the Diploma Course in Indian Music and the examinations in accordance with the Transitory Regulations framed in the years, 1933–34, and 1934–35, and who have not qualified for the Diploma, may be admitted again to the course and permitted to appear for the Diploma Examination.

(9) *Certificate and Diploma in Anthropology.*

Eligibility for Certificate or Diploma.

82. No candidate who has not undergone the prescribed course and satisfied the examiners in the qualifying examinations shall be eligible for the Certificate or the Diploma in Anthropology.

Course of Study. 83. The course of study for the Certificate shall consist of the following:-

Social and Cultural Anthropology

or

Physical Anthropology and Ethnology with practical work.

The course of study for the Diploma shall consist of the following subjects:—

(i) Social and Cultural Anthropology.

(ii) Physical Anthropology and Ethnology with practical work.

(iii) Pre-historic Archaeology with practical work.

Qualification for admission. 84. The Certificate and Diploma Courses in Anthropology shall be open to (1) persons who have qualified for a degree in this University or in any other recognized University, and (2) to such others as may be considered fit to undergo the course by the Syndicate, and have been recommended by the head of the department.

Applications. 85. Applications for admission to the courses must reach the Registrar not later than the 15th June of each year, and be in the prescribed form obtainable at the office of the Registrar.

Duration of Courses. 86. The course for the Certificate in Anthropology shall be a part-time course extending over one academic year, and the course for the Diploma in Anthropology shall be a part-time course extending over two academic years.

Attendance. 87. No student shall be admitted to the examination for the Certificate or the Diploma in Anthropology unless he has attended not less than three-fourths of the lectures provided, and has produced the prescribed certificates; provided, however, that a student who has already passed the examination for the Certificate in Anthropology shall be permitted to appear for the Diploma in Anthropology after undergoing the prescribed course of study for one academic year, and shall be exempted from examination in the subject in which he has already qualified for the Certificate.

Scheme of Examination. 88. The scheme of examination shall be as follows:—

Certificates in Anthropology.

	Hours.	Marks.	
(i) Certificate in Social and Cultural Anthropology—			
1. Social and Cultural Anthropology—Paper I	2	75	
2. Social and Cultural Anthropology—Paper II	2	75	
Total		——	150
(ii) Certificate in Physical Anthropology—			
1. Physical Anthropology and Ethnology ...	3	100	
2. Practical work ...	3	50	
Total		——	150

Diploma in Anthropology.

1. Social and Cultural Anthropology—			
Paper I	2	75	
Paper II	2	75	
		——	150
2. Physical Anthropology and Ethnology	3	100	
Practical	3	50	
		——	150
3. Pre-historic Archaeology ...	3	100	
Practical	1	20	
		——	120
			——
Total ...			420
			——

Passing marks and classification of successful candidates.

89. A candidate shall be declared to have passed the examination for the Certificate in Anthropology if he obtains not less than 40 per cent of the total marks. A candidate shall be declared to have passed the examination for the Diploma if he obtains not less than 40 per cent of the total marks and not less than 30 per cent in each subject. All the other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent of the marks in any subject shall be declared to have passed with distinction in that subject.

Candidates coming under the proviso to Regulation 87 *supra* shall be declared to have passed the examination for the Diploma in Anthropology if they obtain not less than 30 per cent of the marks in each subject taken by them, and not less than 40 per cent of the marks in the aggregate of the papers taken by them.

Successful candidates under this category shall be arranged in a separate list.

Syndicate competent to suspend course and examination.

90. Notwithstanding anything contained in the above Regulations, it shall be competent for the Syndicate, by previous notice in the *Fort St. George Gazette*, to suspend for any year or any number of years the Course and Examination for the Certificate or Diploma in Anthropology.

(10) *Diploma in Journalism.*

Eligibility for Diploma.

91. No candidate shall be eligible for the Diploma in Journalism unless he has completed the prescribed course of study and practical instruction and has satisfied the examiners in the qualifying examination. The practical training shall be for a period of not less than six months in a Newspaper Office approved for the purpose by the Syndicate.

Duration of Course and qualification for admission.

92. The course, which shall be a full-time one extending over one year, shall be open to graduates of this University or of any other recognised University.

Applications. 93. Applications for admission to the course must reach the Registrar not later than the 1st December of each year, and be in the prescribed form obtainable at the Office of the Registrar.

Attendance. 94. No student shall be admitted to the examination unless he has attended not less than three-fourths of the lectures provided, and has produced the prescribed certificates of attendance at the lectures and practical training.

Course of Study. 95. The course of study shall consist of the following subjects:—

(1) Journalism:

(*a*) Newspaper and Magazine Features, including Picture Pages.

(*b*) Editorial Methods and Technique.

(*c*) Reporting and Copy-editing (to include reporting of Law Court Proceedings, Legislature, Public Meetings, Interviews, etc.).

*(*d*) Radio News Editing and Broadcasting.

*(*e*) Advertising (Fundamentals of advertising, display of advertising, advertising typography).

(2) Composition, Precis-writing and Proof Reading.

(3) History of the Freedom of the Press.

(4) Ethics in Journalism.

(5) Legal Studies to include (i) the Law of Libel and Slander, (ii) Law of Copyright, and (iii) Press Laws in this country.

(6) Social and Economic Structure of To-day.

(7) History of the Modern World.

(8) Political Science.

(9) Everyday Science—General.

(**Note*:—Additional subjects in which no examination will be held at the end of the course.)

(10) Modern Constitutions, Constitutional History of India from 1857 to date.

(11) Shorthand.

(12) Typewriting.

The course shall be conducted in English at present; but may later be extended to cover instruction in the South Indian Languages of Tamil, Telugu, Kannada, Malayalam, and Urdu.

In Shorthand and Typewriting there will be a simple test at the end of the course, which will consist of the following:—

(a) *Shorthand* (English)—To take down in the corresponding style of phonography an easy passage, a narrative speech of 560 words, and a simply worded official or business letter of 240 words, dictated at the rate of 80 words a minute. (Time: Ten minutes.) To transcribe the above into longhand. The existence of more than 5 per cent of errors or omissions in the transcription will indicate that the standard has not been reached. (Time: One hour and thirty minutes from the time when the candidate commences to transcribe.)

(b) *Typewriting* (English)—To typewrite an ordinary printed passage containing 375 words. Special attention must be paid to accuracy and neatness of execution. (Time: Fifteen minutes.)

(*Note*:—Candidates may undergo the above course in Shorthand and Typewriting in any of the Institutions approved for the purpose of presenting candidates for the Government Technical Examinations in Shorthand and Typewriting.)

Candidates who have passed at least the Lower Grade of the Madras Government Technical Examination in Shorthand or Typewriting shall be exempted from appearing in that subject.

Scheme of Examination.

96. The scheme of examination shall be as follows—

			Hours.	*Marks.*	*Total.*
A.	(1)	Journalism ...	3	100	
	(2)	History of the Freedom of the Press and Ethics in Journalism ...	2	50	
	(3)	Composition, Precis Writing and Proof Reading ...	2	50	200
B.	(4)	Legal Studies ...	2	50	
	(5)	Political Science and Modern Constitutions, etc. ...	2	50	100
C.	(6)	Social and Economic Structure of To-day ...	2	50	
	(7)	History of the Modern World ...	2	50	
	(8)	Everyday Science—General ...	2	50	150
D.	(9)	Shorthand	1 hr. 40 mins.	50	
	(10)	Typewriting	15 ,,	50	100
			Grand Total ...		550

Passing marks and classification of successful candidates.

97. A candidate shall be declared to have passed the examination if he obtains not less than 30 per cent in each of the divisions A, B and C, and not less than 40 per cent of the total marks in all the papers taken together (except Shorthand and Typewriting). A candidate shall be declared to have passed in Typewriting if he obtains not less than 45 per cent of the marks in that subject and in Shorthand provided he has

not more than 5 per cent of errors or omissions in the complete transcription. All the other candidates shall be deemed to have failed in the examination. Successful candidates who obtain not less than 60 per cent of the marks in Groups A, B and C taken together shall be declared to have passed with distinction.

Candidates who fail in Shorthand and/or Typewriting only shall be required to pass only in Shorthand and/or Typewriting, as the case may be, in which they have failed and they shall not be required to take the examination in the other subjects in which they have already passed. They shall, however, be eligible for the Diploma only after passing the above subjects.

Syndicate competent to suspend course and examination.

98. Notwithstanding anything contained in the above Regulations, it shall be competent for the Syndicate, by previous notice in the *Fort St. George Gazette*, to suspend for any year or any number of years the course and examination for the Diploma in Journalism.

CHAPTER LXXVIII.

Diploma in Physical Education.

Eligibility for Diploma.

1. No candidate shall be eligible for the Diploma in Physical Education unless he has completed the prescribed course of study in an institution or institutions approved for the purpose and has satisfied the Examiners in the qualifying examination.

Course of Study

2. The course of study shall consist of the following subjects :—

(1) Organization and Administration of Physical Education.

(2) Anatomy, Physiology and Hygiene.

(3) Health Education.

(4) First Aid and Safety Education.

(5) Rules of Games, Coaching, etc.

(6) Principles and Philosophy of Physical Education.

(7) History of Physical Education.

Qualification for admission.

3. The course of study shall be open only to students who have qualified for a degree in this University or other recognised Universities.

Duration of Course.

4. The course shall be a full-time one extending over one academic year.

Attendance.

5. A student shall not be admitted to the examination unless he has kept not less than 75 per cent of the total attendance at theoretical and practical work and has produced a certificate from the Head of the Institution certifying that his progress and conduct have been satisfactory.

6. The scheme of examination shall be as follows :—

Scheme of Examination.

(a) *Written Examination* :

		Hours.	Marks.
(1)	Organization and Administration of Physical Education ...	3	100
(2)	Anatomy, Physiology and Hygiene ...	3	100
(3)	Health Education and First Aid and Safety Education ...	3	100
(4)	Rules of Games, Coaching, etc. ...	3	100
(5)	Principles and Philosophy of Physical Education and History of Physical Education ...	3	100
	Total (5 papers) ...		500

(b) *Practical Tests* :—

(1) Teaching Ability, (2) Physical Skills.

Each institution shall be responsible to the University for conducting Practical Tests in Teaching Ability and Physical Skills, and shall report to the University two months before the date of the examination the names of students approved.

Passing marks and classification of successful candidates.

7. A candidate shall be declared to have passed the examination if he obtains not less than 30 per cent of the marks in each paper of the written examination, and not less than 40 per cent of the total marks in all the papers taken together. All the other candidates shall be deemed to have failed in the examination. Successful candidates obtaining not less than 60 per cent of the marks shall be declared to have passed with distinction.

APPENDICES.

APPENDIX XII

EXAMINATIONS IN LAW.

Syllabuses and Text-books.

Note:—1.—No special text-books in the case of Acts of the Indian Legislature are prescribed, but students will be expected to have a mastery of the matter which is usually contained in the best commentaries as well as a knowledge of the bare text of the Acts.

2. Text-books have been prescribed where necessary with a view to indicating the general scope of each subject, but questions will not be confined to the books prescribed.

First Examination in Law.

1. *Jurisprudence.*—
   1. Salmond: Jurisprudence.
   2. Maine's Ancient Law, Ed. Pollock.

2. *Roman Law.*—
   1. Moyle's Translation of Justinian.
   2. Leage: Roman Private Law.

      or

      Buckland: Elements of Roman Law.

3. *Contracts.*—
   1. Anson's Law of Contracts.
   2. Pollock and Mulla—Indian Contract Act.
   3. T. S. Venkatesa Ayyar: Law of Contracts.

4. *Torts.*—
   1. Pollock on Torts.
   2. Salmond's Law of Torts.
   3. The Law of Torts by S. Ramaswami Ayyar.

5. *Indian Constitutional Law.*—

   Government of India Act, 1935, and Rules made thereunder.

B. L. Degree Examination.

1. *Property.*—

Williams: Real Property.

2. *Hindu Law.*—

Mayne's Hindu Law and Usage.

3. *Muhammadan Law.*—

Mulla's Muhammadan Law.

Saksena's Students' Edition of Muhammadan Law.

4. *Criminal Law.*—

Kenny: Outlines of Criminal Law—Indian Penal Code.

Note.—Candidates need study only the portion relating to the general principles and they may omit the special portions of the book.

5. *Evidence.*—

Wills on Evidence.

The Indian Evidence Act.

6. *Land Tenures.*—

Soundararaja Iyengar: Indian Land Tenures.

M. L. Degree Examination.

BRANCH I—JURISPRUDENCE.

Jurisprudence.—

Austin: Lectures on Jurisprudence.

Jethro Brown: The Austinian Theory of Law.

Allen: Law in the Making.

Gray: Nature and Sources of Law.

Holland: Jurisprudence.

Korkunov: Theory of Law.

Goodhart: Modern Theories of Law.

Basu: Modern Theories of Jurisprudence.

Duguit: Law in the Modern State.

Laski: Foundations of Sovereignty and other Essays.

Pound: Introduction to the Philosophy of Law.

History of English Law.—

Holdsworth: History of English Law.
Jenks: History of English Law.
Pollock & Maitland: History of English Law.
Pollock: The Expansion of the Common Law.
Potter: Historical Introduction to English Law.
Radcliffe: The English Legal System.
Maitland: Equity.
Plucknett: History of the Common Law.
Pound: Readings in the History of the Common Law.
Hanbury: Equity.

Roman Law and general outline of the French and German Civil Law.—

Sanders: Institutes of Justinian.
Moyle: Institutes of Justinian.
Poste: Gaius.
Sohm: Roman Law.
Buckland and McNair: Roman Law and Common Law.
Muirhead: Historical Introduction to Roman Law.
Brun: Fontes Juris Romani.
Brissaud: French Private Law.
Cachard: French Civil Code.
Schuster: Principles of German Civil Law.
Wang: The German Civil Code.
Burge: Commentaries on Colonial and Foreign Laws.
Sherman: Roman Law in the modern world.

Ancient Law and Polity.—

Vinogradoff: Historical Jurisprudence.
Sadler: Relation of Custom to Law.
Allen: Law in the Making.
Maine: Ancient Law.
Maine: Early Institutions.
Maine: Early Law and Custom.
Diamond: Primitive Law.
Lowie: Primitive Society.
Malinowski: Crime and Custom in Primitive Society
Kocourek & Wigmore: Primitive and Ancient Legal Institutions.
Aristotle: Politics.
Beni Prasad: The State in Ancient India.

Legislation, method and interpretation.—

Bentham: Theory of Legislation.

Brown: Underlying Principles of Modern Legislation.

Dicey: Law and Public Opinion.

Ilbert: Legislative Methods and Forms.

Maxwell: Interpretation of Statutes.

Beal: Rules of Interpretation.

BRANCH II—CONSTITUTIONAL LAW AND INTERNATIONAL LAW.

Constitutional Law—India and the British Commonwealth.—

Keith: Constitutional History of India.

The Government of India Act, 1935, with Orders in Council and Rules.

Butler Committee's Report.

Sen: Indian States, their status, rights and obligations.

Halsbury: Laws of England, Constitutional Law.

Dicey: Law of the Constitution.

Anson: Law and Custom of the Constitution.

Ridges: Constitutional Law of England.

Forsyth: Cases and Opinions on Constitutional Law.

Keir and Lawson: Cases on Constitutional Law.

Lefroy: Constitutional Law of Canada.

Keith: Responsible Government in the Dominions.

Keith: Constitutional Law of the self-governing Dominions.

Minty: Constitutional Laws of the British Empire.

Kennedy & Schlosberg: Law and Custom of the South African Constitution.

Knowles: Commonwealth of Australia Constitution Act.

Constitutional Law—The United States, France and Switzerland.—

Willoughby: Constitutional Law of the United States.

Burdick: Law of the American Constitution.

Ogg: European Governments and Politics.

Barthelemy: Government of France.

Evans: Leading cases on American Constitutional Law.

Matsunami: Constitution of Japan.

Shiva Rao: Select Constitutions of the World.

Public International Law.—

Oppenheim: International Law.

Hall: International Law.

Lawrence: Principles of International Law.

British Year Books of the International Law.

Pitt-Cobbett: Leading Cases and Opinions on International Law.

Tiverton: Principles and Practice of Prize Law.

Loreburn: Capture at Sea.

Roscoe: English Prize Cases.

Colombos: Law of Prize.

Private International Law.—

Dicey: Conflict of Laws.

Westlake: Private International Law.

Foote: Private International Jurisprudence.

Cheshire: Private International Law.

Cheng: Rules of Private International Law determining capacity to contract.

Beal: Cases on the Conflict of Laws.

Public Authorities, Corporations and Elections.—

Chaster: Law relating to Public Officers.

Moore: Act of State in English Law.

Robertson: Civil Proceedings by and against the Crown.

Robinson: Public Authorities and Legal Liability.

Brice: Law of Companies and Corporations and the doctrine of *ultra vires.*

Das: Law of *ultra vires* in British India.

Rogers: Elections.

Hammond: The Indian Candidates and the Returning Officer.

Vinayaka Rao: Law and Practice of Elections.

Hammond: Reports of Indian Election Cases.

BRANCH III—CRIME AND TORT.

Theory of Crime and Punishment.—

Beccaria: Crime and Punishment.

Gillin: Criminology and Penology.

Sutherland: Criminology.

Parmelee: Criminology.

Lombroso: Crime, its causes and remedies.

Elliot: Conflicting penal theories in statutory Criminal Law.

De Quiros: Modern Theories of Criminality.

Subrahmanya Pillai: Principles of Criminology.

O. H. B. Starte: Reformation of offenders in India.

Development of Criminal Law and Procedure in England and India.—

The Indian Penal Code.
History of Indian Legislation relating to Criminal Procedure.
Pollock & Maitland: History of English Law.
Stephen: History of the Criminal Law.
Kenny: Outlines of Criminal Law.
Holdsworth: History of English Law.
Cowell: Courts and legislative authorities in India.

Comparative Criminal Jurisprudence.—

Callender: American Courts (Chapters on Criminal Courts).
Penal Code of Italy, 1930.
Zebitch: Soviet Administration of Criminal Law.
Penal Code of the Soviet—1934.
Bar: Continental Criminal Law.
Calisse: A History of Italian Law (relevant portions).
Esmein: A History of Continental Criminal Procedure.
Brissaud: History of French Public Law (Continental Legal History Series)—(relevant portions).
Gage and Waters: The Imperial German Criminal Code.
The Criminal Code of Japan.
Swiss Criminal Code of 1937.

Torts—General Principles and Specific wrongs.—

Clerk & Lindsell on Torts.
Street: Foundations of Legal Liability—Vols. I & II.
Holdsworth: History of English Law.
S. Ramaswamy Ayyar: Law of Torts.
Pollock: Torts.
Salmond: Torts.
Winfield: Province of the Law of Tort.
Restatement of the Law of Torts (American Law Institute).
Beven: Negligence.
Garrett: Law of Nuisance.
Odgers: Libel and Slander.

BRANCH IV—CONTRACTS INCLUDING MERCANTILE LAW.

Contracts—General Principles.—

Leake: Contracts.
Pollock: Contracts.

Salmond: Contracts.
Anson: Contracts.
Street: Foundations of Legal Liability.
Holdsworth: History of English Law.
Fry: Specific Performance.

Contracts—Special Contracts.—

Benjamin: Sale.
Blackburn: Sale.
Chalmers: Sale of Goods
Beal : Bailments.
Story: Bailments.
Story: Agency.
Bowstead: Agency.
Lindley: Partnership.
Singhal: Partnership.
Disney: Carriers.
Sale of Goods Act.
Partnership Act.
Indian Statute Law.
Macnamara: Carriers.
Indian Railways Act.

Banking and Negotiable Instruments.—

Byles on Bills.
Chalmers—Negotiable Instruments.
Bhashyam & Adiga—Negotiable Instruments.
Tannan: Banking Law and Practice in India.
Jacobs: Bills of Exchange.
The Indian Negotiable Instruments Act.
Grant: Banks and Banking.

Company Law and Bankruptcy.—

The Indian Companies Act and the English Law on the subject.
Buckland: Companies Act.
Lindley on Companies.
Palmer on Companies.
The Indian Insolvency Acts.
Williams on Bankruptcy.

Insurance and Maritime Law.—

Chalmers: Marine Insurance.
Bunyon: Fire Insurance.
Bunyon: Life Insurance.
Arnold on Insurance.
Porter on Insurance.
Scrutton: Charter Parties.
Carver: Carriage by Sea.
Marsden: Law of Collisions (1934 Ed.)

BRANCH V—HINDU, MUHAMMADAN AND OTHER PERSONAL LAWS.

(No lists of books are necessary to indicate the scope of examination in this group which will be of a very advanced character. A knowledge of the original sources and texts of Hindu Law will be required.)

BRANCH VI—PROPERTY.

Transfer of Property in England and India, including trusts, settlements and conveyancing.—

Hood & Challis: Conveyancing Acts.
The Indian Act with a Comparative Study of English Law on the subject.
Carson: Real Property Statutes.
Lewin: Trusts.
The Trusts Act.
Godefroi: Trusts and Trustees.
Story: Equity jurisprudence.

Transfer of Property in England and India, Sales, Mortgages and Leases.

Dart on Vendors and Purchasers.
Williams on Vendors and Purchasers.
Seaborne on Vendors and Purchasers.
Coote on Mortgages.
Ghose on Mortgages in India.
Fisher on Mortgage.
Woodfall on Landlord and Tenant.
Foa: Landlord and Tenant.

Succession, Testamentary and Intestate.—

Jarman on Wills
Theobald on Wills.
Henderson: Intestate and Testamentary Succession in India.
The Indian Succession Act.

Public Trusts and Charities.—

Tudor on Charities.
Ganapathi Ayyar: Hindu and Muhammadan Endowments.
The Acts on the subject.
Ghose: Hindu Endowments and Religious Institutions.
Saraswati: The Hindu Law of Endowments.

Customary and Statute Law relating to Land Tenures in India.—

Baden Powell: Land Systems of British India.
Sundararaja Iyengar: Land Tenures in the Madras Presidency.
Guha: Land Systems of Bengal and Bihar.
The Estates Land Act.
The Bengal Tenancy Act.
The Malabar Tenancy Act.

APPENDIX XIII.

M.B. & B.S. DEGREE EXAMINATIONS.

SYLLABUSES.

Pre-Registration Examination.

SYLLABUS IN INORGANIC CHEMISTRY.

Candidates will be expected to understand the elements of Chemistry included in the syllabus for the Chemistry part of the Intermediate Examination, and in addition, to have an elementary knowledge of the following subjects :—

The general properties of solids, liquids and gases.

The gas laws and the kinetic theory of gases.

The general properties of solutions, including osmotic pressure and the methods of measuring it, both direct and indirect.

Electrolysis and the theory of ionic dissociation, including the theory of hydrogen-ion concentration and its measurement.

The law of mass action and application to chemical equilibriums.

Colloids, including the effect of surface on chemical actions.

Catalysis and the general conditions of catalytic actions.

Some elementary ideas on the constitution of matter, the classification of the elements ; and radioactivity.

Practical Examination.

Candidates will be expected—

to be familiar with the ordinary materials and apparatus used in laboratories, and with such operations as filtration, solution, distillation, drying, precipitation, crystallisation, and extraction with immiscible solvents ;

to be familiar with the use of chemical balance and the use and calibration of graduated flasks, pipettes and burettes ;

to prepare simple inorganic substances ;

to purify or to make an intelligent attempt to purify a known substance ;

to perform simple quantitative exercises, such as the determination of melting points, boiling points, densities, and the determination of the amount of water in a substance or of the amount of ash left on the ignition of a substance;

to perform any easy gravimetric estimation, for example, a sulphate as $BaSO_4$, carbon dioxide by direct weighing, chloride-ion as AgCl, calcium as CaO ;

to prepare and use in simple volumetric estimation standard solutions of acids, alkalis, permanganate, iodine, thiosulphate and silver nitrate ;

to determine the approximate hydrogen-ion concentration of a given solution by means of indicators ;

to attack with intelligence any simple chemical problem, such, for example, as the separation of two known substances and the preparation of a standard solution of a substance that cannot be weighed.

The Examiners will use their discretion as to whether or not books may be allowed for the whole or part of the practical examination.

SYLLABUS IN PHYSICS.

The whole syllabus is to be treated in an elementary manner and with reference to the subsequent work of the student. The treatment will be mostly experimental and in no case will Mathematics be required beyond elementary algebra and geometry.

General Physics :—Units and measurements of lengths, mass and time ; and the derived units and measurements of velocity, acceleration, force, work and energy, power and efficiency. The laws of motion and conditions of equilibrium of bodies under the action of forces. Simple machines. Uniform circular motion and the centrifuge.

The elements of hydrostatics including methods for the determination of densities. Elementary principles governing the flow of liquids in rigid and elastic tubes. Viscosity and surface tension and their measurements.

Gas laws including the diffusion of gases and elementary ideas of the kinetic theory of matter.

Heat:—The effect of heat on bodies including thermometry, dilation, change of state and calorimetry. Convection, conduction and radiation of heat. The relation between heat and work.

Sound :—The production, propagation and reception of sound waves. The measurement of velocity, frequency and wave length of sound.

Light :—Outlines of the wave theory of light including Interference, diffraction, double refraction and polarization of light. Simple geometrical optics, including reflection and refraction of plane and curved surfaces. The range of electromagnetic waves and various kinds of spectra. Optical instruments including the spectrometer, the photographic camera, the eye as an optical instrument, the microscope and the polarimeter.

Electricity and Magnetism :—The elementary facts and phenomena of magnetism and static electricity.

The production of electric currents and their chemical, magnetic and heating effects. Units and measurements of current strength, potential difference and resistance. Thermo-electric couples.

Electro magnetic induction, and Ruhmkorf's coil, electric discharge in rarefied gases, Cathode and X-Rays.

Practical Examination.

Practical Physics :—Students are expected to have a practical knowledge of the following subjects :

General :—The use of graphs and diagrams.

Elementary mensuration and mechanics.

The use of a delicate balance, thermometers and the barometer.

The use of the vernier, the screw-gauge and the spherometer.

The determination of densities of solids, liquids and gases.

The use of the falling plate. Fletcher's trolley or Atwood's machine to determine g and n.

The simple pendulum.

The determination of surface tension by (a) the rise in a capillary tube, (b) the surface tension balance.

The comparison of viscosities of liquids.

Heat :—The determination of melting and boiling points.

The determination of the co-efficient of expansion of solids, liquids and gases.

The determination of specific and latent heats by the method of mixtures and of specific heats by the method of cooling.

The determination of the mechanical equivalent of heat.

The use of hygrometers.

Sound :—The use of the sonometer and resonating columns of gases.

Light :—The use of Photometers.

The determination of focal length of spherical mirrors, thin lenses and combinations of thin lenses.

The determination of the wave length of light by diffraction grating.

The use of the polarimeter, spectrometer and the microscope.

Electricity :—The use of electric batteries.

Mapping Magnetic fields.

The experimental proof of the Laws of Electrolysis.

The measurement of resistance by the metre bridge and Post Office Box.

The comparison of E.M.F.'s by (1) Tangent Galvanometer, (2) the Potentiometer.

The use the electrical calorimeter.

The measurement of the conductivity of an electrolyte.

The use of a Thermo-couple.

SYLLABUS IN BIOLOGY.

The examination in Biology shall comprise the subjects included in the following syllabus, which is intended only to indicate its general scope and character :—

A. General Biology.—

The distinctive properties of living and non living matter.

The differences between animals and plants.

The nature and properties of protoplasm.

The structure of the cell; cell division and gameto-genesis.

Conjugation and fertilization.

Segmentation and formation of germ layers.

Structure and function of animal tissues.

B. Botany.—

The structure, life-history, and physiology of Yeast, Bacteria, Mucor, Penicillium, Spirogyra, Chara, fern.

The elements of the morphology and physiology of the Angiosperms embracing (*a*) the structure (macroscopic and microscopic) of the root, stem and leaf: (*b*) the structure of a typical flower and modifications of the type; (*c*) the inflorescence; and the principal types of branching; (*d*) the structure and development of the seeds and embryo; (*e*) the principal types of fruits; (*f*) the dispersal of seeds and fruits; (*g*) the main facts in relation to nutrition, growth and reaction to environment.

The reproduction and life-history of Angiosperms.

C. Zoology.—

The structure, life-history and physiology of Amoeba, Paramæcium, Euglena, Hydra, Earthworm, Leech, Cockroach and the anatomy of Frog and Rabbit. (Only an elementary knowledge of the muscular system of the frog, and the muscular and nervous system of the rabbit will be required).

An elementary knowledge of the more important types of animal parasites, protozoan, and metazoan, such as Entamœba, Trypanosoma, Plasmodium, Liver-fluke, Tape-worm, Round-worm, etc.

The leading types of reproduction in animals. The main features of the larval history and metamorphosis of the frog, the embryonic membranes and placenta of the fœtus of the rabbit.

The Chief external characters and poison apparatus of the poisonous snakes of South India.

D.—

Variation, Heredity, Natural Selection, Evolution treated in an elementary manner.

Practical Examination.

Each candidate must be prepared to examine microscopically, to dissect and to describe the specimen of parts of the animals and plants enumerated in the foregoing syllabus with the exception that for the skull of the rabbit will be substituted that of the dog.

First M.B. & B.S. Examination.

SYLLABUS IN ORGANIC CHEMISTRY.

The examination in Organic Chemistry shall comprise the following :—

The ultimate analysis of organic compounds, and estimation of carbon, hydrogen, nitrogen, sulphur, phosphorus and the halogens.

The determination of empirical, molecular, and structural formulæ, and of molecular weights of organic substances.

The constitution and most important reactions and relationships of the following groups of compounds, illustrated in each case by a reference to a few of their most important members :—

Aliphatic series.—

Paraffin, Unsaturated hydro-carbons. The different classes of alcohols and their derivatives. Halogen and nitro derivatives of the hydro-carbons. Aldehydes. Ketones. Acids. Sulphonic acids. Simple ethers. Esters. Amines. Phosphines. Arsines, Amino-acids. Amides. Nitrites. Cyanides. Urea.

Aromatic series.—

Benzene. Toluene and the simple derivatives.

Phenols with special reference to phenol, pyrocatecol, resorcinol, and hydroquinol, pyrogallol.

Benzyl alcohol, Benzaldehyde, benzoic acid, salicylic acid, gallic and tannic acids, phthalic acids, phenophthalien, Glucosides and Alkaloids.

Practical Examination.

The detection of the following elements:—Carbon, hydrogen, nitrogen, sulphur, phosphorus and the halogens.

Preparation of chloroform and of iodoform from ethyl alcohol and preparation and hydrolysis of an ester and of an amide.

Tests for and reactions of methyl alcohol, ethyl alcohol, glucose, cane sugar, phenol, salicylic acid, formates, acetates, oxalates, cyanides, tartrates, citrates, morphine, strychnine; quinine; cinchonine and urea.

The preparation of a fatty acid from a fat. The determination of the molecular weight of a fatty acid by titration.

Candidates will be required to bring to the practical examination note books containing record of their previous practical work. These note books must be certified by the teachers of the candidates as being the actual working notes made by them in the laboratory.

(Examiners will use their discretion as to whether or not the candidates may be allowed books for the whole or parts of the practical examinations.)

SYLLABUS IN PHYSIOLOGY.

Muscle and Nerve.—

Structure and properties of muscle—effects on contraction of load and fatigue—chemical, thermal and electrical changes in muscle—conduction in nerve—polarisation phenomena in nerve—reaction of degeneration.

Central Nervous System.—

Reflex action in 'Spinal' frog and in man. Structure and functions of the Spinal cord. Spinal mechanism of co-ordinated movements.

Structure and functions of the Brain. Stem. Connections and functions of cranial nerves.

Cerebellum.

Structure and connections of the Cerebrum and its functions. Cerebral localisation.

Autonomic nervous system.

Special Senses—

Muller's law of specific irritability of nerves. Weber's law.

Structure of the eye-ball. Light reflex. Mechanism of accommodation. Refraction of the eye. Common optical defects. Use of ophthalmoscope. Perimeter. Retina and its connections. Formation of retinal images. Colour vision and contrast.

Structure of auditory and vestibular apparatus. Auditory sensations. Labyrinthine impressions.

Structure of larynx. Production of voice. Use of Laryngoscope.

Cutaneous sensations. Gustatory and olfactory sensibility.

Digestion.—

Secretion and properties of the digestive juices and bile.

Movements of the stomach and intestines.

Absorption of foodstuffs.

Metabolism.—

Metabolism of proteins, fats and carbohydrates. Glycosuria. Estimation of Metabolism. Nitrogen-balance. Influence of work and starvation on Metabolism. Normal Diet.

Temperature of man and its regulation.

Blood.—

Formed elements, their origin, life history and functions. Haemoglobin and its chemistry, Haemolysis. Coagulation. Reaction of blood. Estimation of volume of blood, corpuscles and Haemoglobin.

Circulation.—

Physiological anatomy of the Heart, and action of valves. The mechanism of heart pump. Causation of heart beat. Properties of cardiac muscle. Factors influencing the activity of cardiac muscle. Output of heart. The nervous regulation of the heart. Heart reflexes. Coronary circulation.

Blood pressure. Velocity of blood. Pulse. Capillary circulation. Vasomotor mechanism. Chemical regulation of blood-flow. Influence of exercise on circulation.

Lymph and its formation. Lympho-gogues. Cerebro-spinal fluid.

Respiration.—

Mechanics of respiratory movements. Chemistry of respiration. Regulation of respiration. Effect of changes in the air breathed. Estimation of total respiratory exchange and of composition of expired and alveolar air.

Excretion.—

Urine, its composition and characters, Secretion of Urine.

Physiology of Micturition.

Skin and skin glands. Their structure and functions.

Endorcrine Organs.

The Physiology of reproduction.

Secretion and properties of Milk.

SYLLABUS IN HISTOLOGY.

Preparation of specimens of normal tissues, either fresh or previously prepared, so as to demonstrate their minute structure.

Application of the commoner histological methods.

Recognition and description with diagrams, or microscopic preparations of any normal tissue or organ.

PRACTICAL PHYSIOLOGY.

The methods employed for the demonstration of fundamental physiological processes and performing simple experiments.

SYLLABUS IN BIOCHEMISTRY.

Theory.—

I. The Chemistry of Food.
   (a) Inorganic.
   (b) Organic Chemistry of proteins, fats and carbo-hydrates.
   (c) Vitamins.

II. The Chemistry of Digestion and absorption in Man.

III. Metabolism—General and special.

IV. The Chemistry of Respiration and acidosis.

V. The Chemistry of Blood and Lymph.

VI. The Chemistry of Urine and faeces.

Practical.—

Properties and Reactions of (a) Carbo-hydrates—Glucose, Levulose, Maltose, Lactose, Cane sugar, Starch, Glycogen and Dextrins.

(b) Fats—olive oil, oleic acid and palmitic acid, glycerol and cholesterol.

(c) Proteins—Albumin and Globulin, Metaproteins—Proteoses—Peptones, amino acids and mucin, gelatin, and casein.

Estimation of Carbohydrates, Glucose, Levulose, Maltose, Lactose.

Estimation of amino-acids.

Properties of Digestive Enzymes—Bile—analysis of Gastric contents.

Qualitative tests and properties of blood and urine.

Quantitative estimation of chlorides, urea, sugar, non-protein-nitrogen, createnine and uric acid in blood, and chlorides, sulphates, phosphates, urea, sugar, createnine, ammonia acidity and uric acid in urine.

Estimation of alveolar carbon-di-oxide by Fredericia's method.

Second M.B. & B.S. Examination.

SYLLABUS IN PHARMACOLOGY.

The course in Pharmacology consists of lectures, demonstrations in experimental pharmacology and practical pharmacy, the aim being to impart a general knowledge of the mode of action of drugs treated from an experimental point of view.

The lectures are devoted chiefly to the discussion of the effects of drugs and poisons on the tissues of man and animals and how these effects may be utilised to relieve or cure disease. The total number of lectures should not be less than 35. The general scheme of the lectures is as follows:—

The mode of action of drugs treated from an experimental standpoint.

Pharmacology of the Central Nervous System:—

Alcohol: General anæsthetics; Hypnotics of the methane series; Bromides; Opium and Cannabis indica.

The Caffeine group: Camphor; strychnine.

Peripheral nervous action.—Curare group; nicotine group; Belladonna group; pilocarpine group. Aconite and Veratrine.

Local Anæsthetics:—Cocaine and its substitutes; Hydrocyanic acid.

Pharmacology of the Genito-urinary system:—

Diuretics and urinary antiseptics.

Ergot: Hydrastis.

Gland Secretions:—

Adrenalin; Pituitary extract; Thyroid extract; Parathyroids and Insulin.

Pharmacology of the Circulation:—

Digitalis group.

Pharmacology of the Vessels.—

Vaso-constrictors and Vaso-dilators.

Pharmacology of respiration.—

Stimulants: Depressants; Anti-spasmodics; Expectorants; Saponins; Ipecacuanha; Respiratory disinfectants.

Pharmacology of the Alimentary Canal.—

Bitters; Volatile oils; Purgatives; Astringents; Emetics; Anthelmintics.

Pharmacology of Temperature regulation.—

Anti-pyretics; Salicylates.

Drugs acting on the excretion of Uric Acid.—

Colchicum; Atophan.

Skin irritants and *Counter-irritation.*

Antiseptics and *disinfectants.*

Drugs acting on metabolism.—

Phosphorus.

Specific Therapy.—

Cinchona alkaloids; Mercury; Arsenic; Bismuth; and Antimony.

Ion-action and *Salt action.*

Certain Positive ions.

Hydrates and Carbonates of the Alkalies Soap.

Certain negative ions, Acids.

General action of heavy metals.—

Iron; Silver; Zinc; Copper; Lead; Aluminium; Manganese; Chromium; Gold. Radio-active metals.

Ferments. Sweetening agents; Demulcents and Emollients.

Vitamins.

Prescription writing; Incompatibility; Synergism; Antagonism.

The physical and chemical properties of the drugs are considered only in so far as they concern their action and the methods of administration. A selection of the more important pharmaceutical preparations is also considered.

Demonstrations in Experimental Pharmacology are used to illustrate the lectures as far as practicable.

Practical Pharmacy: the course to be not less than 20 meetings.

Final M.B. & B.S. Degree Examination.

MENTAL DISEASES.

The course of Mental Diseases shall comprise instruction in the following types of Disorder:—

(i) Failure of Mental Development—

Idiocy; Imbecility; Weak-mindedness.

(ii) Mania-Depressive-Insanity—

Mania; Melancholia; Stupor; Alternating and Circular conditions.

(iii) Delusional Insanity and Paranoia.

(iv) Dementia—

Primary or Adolescent (D. Præcox), Consecutive or Terminal; Organic; Para-Syphilitic (G.P.I.) Senile.

(v) Insanity due to drugs—

Alcohol; Indian Hemp; Opium and its derivatives; Cocaine; Lead.

(vi) Epileptic Insanity.

(vii) Hysteria and Psychasthenia.

(viii) Exhaustion Psychoses.

Post Febrile Insanity; Acute Delirium; Neurasthenia.

(ix) Esochal Insanities—

Insanity of Puberty and Adolescence; Insanity of the child bearing period; Insanity of Climacteric; Insanity of old age.

(x) Mental Disorder, associated with Physical diseases—

Diseases of the Thyroid Gland; Polioencephalitis; Syphilis; Tubercle; Nephritis, Diabetes and Gout.

(xi) The Medico-Legal and Social relationships of Insanity.

(xii) General Treatment.

Text-Book.

Medicine by Connybere or by Tidey.

APPENDIX XIV.

Post-Graduate Diplomas in Medicine and Surgery.

SYLLABUS FOR THE DIPLOMA COURSE IN TUBERCULOSIS.

Introductory:—

Historical review.

Bacteriology of Tuberculosis:

Acid-fast bacilli; morphology and staining; types, differentiation by culture methods; by virulence tests, path genicity; atypical strains, dissociation, B. C. G. inter-relationship between human and bovine types.

Pathology of Tuberculosis:

Modes of infection; Morbid histology; contact, inhalation and ingestion. Tissue changes caused by invasion with tuberculosis; local, regional and generalised lesions; bronchogenic, hæmatogenic, lymphatic and contiguous spreads. Pathological lesions in human tuberculosis in lungs, gross and histological characteristics, early inflammatory changes, tubercle formation, caseation, granulatic tissue, fibrosis, calcification; cavity formation; evolution of cavities, fresh and chronic; factors determining size, shape, progress or retrogression. Atelectasis, massive collapse; tuberculous tracheo-bronchitis; laryngitis.

Pathology of pleura; lymphatic glands; intestines; kidneys, testis, epididymitis and other genito-urinary organs; bones; joints.

Resistance and Immunity:

Resistance, natural and acquired, immunity reactions, seriological tests. Tuberculin (preparation of old Tuberculin and P.P.D. standardization by shock method and intracutaneous method in guineapigs and humans). Koch's phenomenon. Allergy and tuberculin hypersensitivity; experimental and clinical evidence. Relation between allergic reaction and immunity; disensitization with tuberculin. Tissue changes in allergic and non-allergic individuals

Evolution of Pulmonary Tuberculosis:

Clinical forms, Childhood and adult types. Ranke's stages. Primary complex. Re-infection, endogenous and exogenous.

Types of lesions as reflected in X-ray pictures; exudative, productive, fibrotic and intermediary forms. Epituberculosis, acute and chronic, miliary tuberculosis, ch. disseminated tuberculosis, latent disseminated tuberculosis.

Tuberculosis in Children:

Anatomy of the Chest:

Thorax, skeleton, ligaments, muscles, nerves and vessels. Lungs, pleura, mediastinum, pericardium and heart. Lymph glands and lymphatics. Diaphragm. Histology of lung, bronchi bronchioles and alveoli.

Surgical anatomy of chest and neck with special reference to surgical in pulmonary tuberculosis.

PULMONARY TUBERCULOSIS.

(i) Etiology of pulmonary tuberculosis.

(ii) Symptomatology of pulmonary tuberculosis—toxic group, local group and group of symptoms referable to other organs.

(iii) Diagnosis.

History taking—physical examination—X-ray examination—Temperature chart—Tuberculin tests—Laboratory examinations—Sputum, stomach, lavage, urine, faeces, pleural effusions, cerebral spinal fluids and other secretions.

Treatment.—Introduction and general principles—Home, Ambulatory or Institutional treatment—Rest, graded exercise and conservative treatment—auxiliary surgical intervention—psychology of tuberculous patients—hygienic regime—discipline and co-operation of patients—disposal of sputum—prognosis.

Symptoms, significance and treatment—cough, sputum, fever, haemoptysis and gastro-intestinal disturbances. Direct, medicinal and chaemo-therapeutic treatment —Artificial and Heliotherapy—Tuberculin—Occupational therapy.

Surgical treatment.—Historical review of collapse therapy—its discovery and improvements—the principles involved in the

rationale of collapse therapy—influence of collapse on pulmonary circulation—effect on tuberculous lesion and cavity—Clinical effects as seen in a patient—various methods of collapse therapy.

Artificial Pneumothorax :

Indications and contra-indications—Technique of induction—Various types of apparatus used—maintenance of satisfactory artificial pneumathorax—spacing of refills, etc.—Control by clinical and radiological observations. Complications of artificial pneumothorax treatment—both immediate and late and their treatment.

Thoracoscopy :

Different instruments used—Technique of operation—Preparation of patient—Localisation of adhesions—Operative and post-operative complications and their treatment.

Extra-Pleural Pneumothorax :

Indications—their technique and maintenance.

Diaphragmatic Paralysis :

Phrenic crushing—its influence on tuberculous disease—changes taking place in the pleural cavity and lung as a result of diaphragmatic paralysis—its rationale in the treatment of pulmonary tuberculosis. Operative technique and various methods of operation like crushing, division or evulsion—operative and post-operative complications and their treatment.

Pneumo-Peritoneum :

Its action and use in pulmonary tuberculosis and abdominal tuberculosis—technique—maintenance.

Apicolysis :

Its usefulness in pulmonary tuberculosis—technique of operation—Operative and Post-operative complications.

Oleo-Thorax :

Drainage of Cavities :

Indications and contra-indications.

Thoracoplasty :

Evolution of operative methods—Indications and contra-indications—technique—various modifications — Operative and

post-operative complications and their treatment, combination of different operative methods.

Results of Collapse Therapy :

Other Methods of Treatment :

Chæmo-therapy by gold salts—specific treatment by tuberculin—Vaccines and sera—Intra-pulmonary injections like G.O.C.C.—symptomatic treatment.

Treatment of Extra Pulmonary Tuberculosis in combination with tuberculosis of the lung like Pleurisy, Empyema, Laryngitis, Meningitis.

Non-Pulmonary Complications in Combination like pregnancy, diabetes, syphilis, heart disease, etc.

Prognosis in Pulmonary Tuberculosis :

(i) Immediate.

(ii) Regarding ability to work.

(iii) Regarding length of life.

Classification of Pulmonary Tuberculosis :

(i) On admission.

(ii) On discharge.

(iii) Other methods of classification as followed in western countries such as (*a*) Turban Gerhadt, (*b*) Inmam, (*c*) Sir Robert Philip, (*d*) Lyle Cummins, (*e*) classification of National Tuberculosis Association of America, and (*f*) classification according to the Tuberculosis Association of India.

Tuberculosis in the insane :

Medico-Legal and Insurance Aspect of Tuberculosis :

After care and Rehabilitation :

Follow up of cases—Supervision and after care by institutions—Clinics and general practitioners—Health visitor and tuberculosis nurse—Settlements for ex-patients—adaptation of occupation—social and economical aspects.

Prevention of Tuberculosis:

Surveys—purpose, method and conduct with respect to infection rate, morbidity and mortality—mass radiography—Various

types of survey—statistical consideration. Prophylactic vaccination—experimental and clinical evidence in favour of artificial immunization—value of B.C.G.—distribution and scope of B.C.G. vaccines

A Co-ordinated Anti-Tuberculosis Scheme:

Tuberculosis clinics—functions and utility—Hospitals and Sanatoria—Colonies and settlements—Tuberculosis homes for incurables.

After-care Committees—Training of tuberculosis workers—Doctors, Specialists, Nurses, Health Visitors.

RESEARCH.

NON-PULMONARY TUBERCULOSIS.

General considerations and mode of infection in non-pulmonary tuberculosis.

Tuberculosis of Bones:

Normal anatomy of bone—blood supply of bone—Microscopic anatomy of bone—periosteum—the epiphyseal cartilage—epiphysis—the diaphysis and bone-marrow.

Histology and Histogenesis of Original Tubercle:

The intra-vascular tubercle—the peri-vascular tubercle—further changes in the original follicle.

Associated Changes in:

(i) Bone marrow,

(ii) Lamellar changes,

(iii) Periosteal changes and

(iv) Changes in the blood vessels.

The Gross Pathological Varieties of Osseous Tuberculosis:

The encysted tuberculous lesion—the infiltrative tuberculous lesion—the atrophic tuberculous lesion—the hypertrophic tuberculous lesion.

Sequestrum Formation:

Possible Sequelae of Bone Tuberculosis:

Method of Healing in Bone Tuberculosis:

The Localization of the Lesion of Osseous Tuberculosis :

Tuberculosis of the Joints :

Normal anatomy of the joint—Structures that go into the formation of a joint—formation of primary tubercle—changes in the component parts of the joint—Gross pathological varieties of joint tuberculosis—various clinical evidences and sequelae of joint tuberculosis—Method of healing in joint tuberculosis.

Diagnosis of Bone and Joint Tuberculosis :

History, age, symptomatology, position of lesion, X-ray examination, tuberculin and other tests.

Differential Diagnosis of Tubercular Disease of Bones and Joints with other Diseases which are common.

The X-ray appearances in Tuberculosis of Bones and Joints.

A Detailed Study of the Diagnosis :

Symptoms, complications, management and treatment of the following joints and bones :

Joints.—Spine joint, hip joint, knee joint, ankle joint, shoulder joint, elbow joint, wrist joint, sacrolliac joint.

Bones.—Long bones of hand and foot, skull bones, vertebrae, upper and lower jaw, malar bone.

Treatment of Joint Tuberculosis : Conservative and operative.

Principles of apparatus used : Various types of splints.

Plaster of Paris—Modes of preparation—methods of application and maintenance.

Tuberculosis of the Intestines :

History of intestinal tubercle.

Anatomy of the intestines.

The normal physiology of the intestinal movement.

Pathological anatomy of intestinal tuberculosis.

Histology of intestinal tuberculosis.

Gross pathology of intestinal tuberculosis.

Modes of healing.

Complications and sequelae.

Change of physiological movement of Intestines in tubercular disease—

Etiology of intestinal tuberculosis.

Experimental intestinal tuberculosis.

The importance of frequency of secondary intestinal tuberculosis.

The site of lesion in intestinal tuberculosis.

Primary and secondary intestinal tuberculosis.

Clinical signs and symptoms of intestinal tuberculosis.

Clinical examination in intestinal tuberculosis.

Pulmonary conditions in secondary intestinal tuberculosis.

Diagnosis of Intestinal Tuberculosis:

Clinical, laboratory and Rontgen Rays.

Complications of intestinal tuberculosis.

Prognosis of Intestinal Tuberculosis :

Treatment of Intestinal Tuberculosis :

Tuberculosis of the peritoneum.

Tuberculosis of the Rectum—Ischiorectal abscess, etc.

Tuberculosis of the larynx—frequency—its association with pulmonary tuberculosis—methods of onset—pathological changes in the larynx—diagnosis and differential diagnosis—Management and treatment.

Tuberculosis of the genito-urinary tract in both sexes.

Tuberculosis of the kidney, bladder, ephididymis, testis, etc.

Tuberculosis of the ovary, tubes and other organs.

Tuberculosis of the skin—various manifestations, diagnosis, differential diagnosis, management and treatment.

Tuberculosis of the eye.

Tuberculosis of the ear.

Tuberculosis of the tendon sheaths.

Tuberculosis of the nervous system.

PRACTICAL DEMONSTRATIONS.

Bacteriology :

1. Smear examination of sputum — Ziehl Neelsen and Picric acid.
2. Preparation of different culture media for tubercle bacilli.
3. Culture of the bacilli from the sputum.
4. Culture of the bacilli from the pleural fluid.
5. Culture of the bacilli from other tuberculous fluids.
6. Demonstration of the cultural characters of different types of bacilli and demonstrations of other differentiating points between human and bovine bacilli.
7. Examination of the fæces for tubercle bacilli.

Pathology :

1. Total and differential counts of blood.
2. Von Bonsdorff's count of blood.
3. Schilling's count of blood.
4. Sedimentation rate of erythrocytes.
5. Lymphocyte : Monocyte ration of blood.
6. Opsenic index of blood.
7. Method of animal inoculation with bacilli.
8. Post-mortem examination of an animal, and how to make sections of organs for histological examination.
9. Post-mortem examination of a human body and how to make sections for histological examination.
10. Normal lung and different types of tuberculous disease of the lungs—demonstrations.
11. Histology of normal lung and pleura (demonstration).
12. Histology of tuberculous lung and pleura (demonstration).
13. Staining methods for tissues—preparation of the tissue—section cutting—staining and diagnosis.
14. How to preserve and bottle a specimen.
15. Tuberculin tests and readings.
16. Macroscopic and Microscopic appearance of tuberculous lesions of other organs (demonstration).
17. Demonstration of para-tuberculous lesion.

Radiology :

1. Demonstration of an X-ray plant.
2. Demonstration of screen examination.
3. Demonstration of taking skiagram and developing the film.
4. Demonstration of stereoscopic pictures and tomography.
5. Demonstration of lipiodal bronchography.
6. Demonstration of mass radiography technique.

Post-mortem room attendance—Pathological specimens.

Clinical work :

Includes attendance at chest out-patient departments of Tuberculosis clinics—In-patient departments in a recognized sanatorium or hospital for Pulmonary tuberculosis.

Orthopædic section of General Hospital for study of bone tuberculosis.

Attendance at, and carrying out treatment in, artificial pneumothorax, aspirations, oleothorax ; attendance and assisting at operations such as phrenic nerve operation, thoracoscopy and cauterization, suction drainage ; thoracoplasty operations and bone operations.

Attendance at ear, nose and throat and eye clinics with special demonstration of tubercular conditions in these organs.

APPENDIX XV.

B.S.Sc. DEGREE EXAMINATION.

SYLLABUSES.

Entomology and Parasitology.

Entomology.—The structure and life history of insects with special reference to Diptera.

The structure, life-history, habits, classification and relation to disease of—

(i) The Blood sucking Nematocera and Brachycera, especially, Culicoides, Phlebotomus, Simulium, Culex, Anopheles, Stegomyia, the Leptidæ and Tabanidæ.

(ii) The Muscidæ, Acalypteræ, and Calypteræ, especially, Musca, Stomoxys, Glossina, Hippobosca, and their allies, Sarcophaga.

(iii) The house fly and other diptera which frequent human dwellings.

(iv) The myasis-producing flies of man and animals.

(v) Siphonaptera, Rhyncota, Siphunculina and Mallophaga.

(vi) Spiders, ticks and mites.

The poison apparatus of snakes and other venomous animals.

Entomological Surveys and Insect Control.

Protozoology.—An introduction to the Protozoa, Sarcodina, Ciliata, Flagellata, Sporozoa; their relation to disease. Malaria surveys.

Helminthology.—The structure, life-history and classification of Nematodes, Cestodes, Trematodes and Hirudinea. The control of helminth infection.

The course shall consist of lectures and practical work in the laboratory and in the field; on the collection and preservation of insects, worms and protozoa; detailed study of the more important insects and worms by means of dissections and other preparations; the breeding of mosquitoes, flies and other insects; entomological surveys and the identification of insects; the detection and identification of the commoner parasites and ova in the blood, urine, fæces of man and animals; demonstrations of macroscopic and microscopic preparations.

Bacteriology.

The course of lectures shall include the classification, characters and life-history of the pathogenic and the commoner non-pathogenic microbes, fungi and yeasts, more especially those concerned with the causation and spread of endemic and epidemic diseases and of diseases of animals transmissible to man ; the bacteriology of air, water, soil and food ; disinfectants, their standardisation and use ; immunology and serology ; and bacterial vaccines and their use in the diagnosis, prevention and treatment of infectious disease as well as in the identification and classification of bacteria.

The course of laboratory work shall comprise practical training in general laboratory technique, sterilisation, preparation of media, the study in detail of the commoner microbes by ærobic and anærobic and other methods, the separation of pure cultures and identification, general and special ; microscopical and cultural methods used in the bacteriological examination of air, water, soil, sewage and sewage effluents, foods, special attention being paid to the routine methods employed in the diagnosis and prevention of disease; the standardisation of disinfectants and estimating the comparative value of disinfectant processes by their lethal action on microbes ; the preparation of bacterial vaccines, the application of serological tests.

Demonstrations of special methods and processes and tests which cannot be conveniently carried out by the class shall be given from time to time.

Climatology and Meteorology.

The elements of climatology as applied to Public Health. Air pressure and its influence on health ; barometers, corrections for barometers. Temperature, thermometers and their uses, methods of making observations, maximum and minimum thermometers, solar and terrestrial radiation thermometers, soil thermometer, thermographs, the influence of temperature on health and ventilation. Humidity :—hygrometers, direct and indirect determination of humidity, the influence of humidity on health and ventilation. Rainfall, raingauges, the influence of the configuration of a region on the rainfall, the influence of rainfall on health. Winds:—estimation of direction and velocity and pressure, determination of the direction and strength of air currents, prevailing winds, monsoons, cyclone and anticyclone systems, weather charts and weather forecasts. Atmospheric electricity, thunderstorms.

Special consideration of the meteorological conditions prevailing in the Presidency and in India generally and their influence on the prevalence and spread of certain epidemic and infectious diseases.

PHYSICS AND CHEMISTRY IN RELATION TO PUBLIC HEALTH.

The general principles of Physics as applied in Public Health in heating, cooling, lighting, ventilation, drainage, and filtration. The general principles of Inorganic, Organic, and Physical Chemistry in relation to the methods and processes in common use in Public Health.

The character and composition of air, water, soil, sewage, their impurities and the methods of detection.

The character, composition and adulteration of the more commonly used foods, condiments and beverages.

The characters and composition of the important disinfectants and antiseptics, their modes of action and standardisation. Methods of analysis commonly used in Public Health work, interpretation of results in the framing of opinions and reports.

Laboratory work as shown below:—

Water.—Sampling, physical examination, qualitative tests, quantitative determination of the total solid residue, dissolved gases, carbonates, chlorides, sulphates, Nitrites, Nitrates, Organic matter in terms of "Albuminoid Ammonia", organic Carbon and Nitrogen and as Oxygen absorbed. Ammonia, Phosphates, Lime, Magnesia Hardness, Poisonous metals. Microscopic examination of the deposit.

Sewage.—Chemical and Physical examination of sewage and effluent after treatment.

Air.—Quantitative estimation of Carbon dioxide, detection of Sulphuretted hydrogen, Nitrous acid and Nitric acid.

Soil.—Determination of size of grain, determination of sand and clay, determination of water capacity, porosity and permeability, determination of Ammonia and Organic Nitrogen in the soil, and of Carbonic acid in the ground air.

Food.—Qualitative and quantitative chemical examination of milk, condensed and preserved milk powders, curds, butter-milk, butter, ghee and other animal fats, edible vegetable oils, cheese, confections and honey preserves, wheat flour and other cereal flours, bread, starch, tea, coffee, cocoa, vinegar, lime-juice, aerated waters,

alcoholic drinks, tinned and preserved foods, the detectio and estimation of the common adulterants in the above. Detection and estimation of antiseptics, preservatives, colouring matters, poisonous and deleterious substances in food.

Disinfectants.—The chemical examination of the more important disinfectants, more especially the estimation of Chlorine in Bleaching powder and chlorine solutions, formaldehyde, phenol. Demonstrations of special methods and processes and tests which cannot be conveniently porformed by the class will be given from time to time.

THE PRINCIPLES AND PRACTICE OF PUBLIC HEALTH.

The Administration of Public Health, the practice in India and more particularly in this Presidency compared with that in England and Scotland, the United States, and European Countries. The Local Self-Government Department, and the Minister of Health. The Director of Public Health and his staff. The Public Health Commissioner and the Surgeon-General in their relations with the Public Health Department. The Local Authorities, District Boards, Taluk Boards, Union Boards. The Municipalities. The Health Officer, District and Municipal, and the City of Madras. The Collector, the Village Munsiff. The Village Panchayat and the Village. The Health Staff in Municipalities and Rural Areas. Other Bodies, Organisations and Officials with whom the Health Officer may have dealings. The law in relation to Public Health. The English Public Health Acts and the Rules and Regulations framed thereunder. The laws in force in the Presidency together with the Rules and Regulations made under these, Government Orders, Departmental and other Memoranda and Codes.

Note.—Detailed instruction in Sanitary Laws and Administration as outlined above, the practical application of these Laws and the discussion of problems arising in the administration of Public Health in the Presidency, will be given in a series of Special Lectures by an Assistant Director of Public Health.

Water.—The properties of water, the quantity and supply of water, sources of water-supply, storage and delivery, impurities, the chemical examination of water, the bacteriological examination of water, the interpretation of the results of a water analysis, the law relating to water-supply.

Air and Ventilation.—The composition and physical properties of air, impurities in air, diseases produced by impurities in air, examination of air, quantity of air required for ventilation, systems of ventilation, heating and cooling, examination of the sufficiency of ventilation.

Soils, Sites and Habitations.—Geological origin of soils, soil features which influence health, conformation, exposure, vegetation, irrigation, temperature, micro-organisms, organic matter, ground air, ground water, dampness, soil pollution, examination and comparison of soils, soil in relation to special diseases; Sites and habitations, design and construction, housing problems; Civic surveys and town planning; Schools, hospitals, other public buildings, markets, slaughter-houses, cowsheds, bakeries, grain stores; Hotels, hostels, tenement and lodging houses, labourers' dwellings, construction camps, temporary dwellings such as pilgrim camps, evacuation camps, inspection of sites and dwellings and other buildings.

Conservancy and Sewage.—Collection, removal, and disposal of town and house refuse, conservancy systems, latrine, urinals, collection, removal and disposal of night soil, appliances, conservancy depots; collection, removal and disposal of sullage, the removal of sewage by water carriage, appliances and fittings, drains and sewers, ventilation, inspection and maintenance, disposal of sewage, purification of sewage, examination of sewage, disposal of trade, effluents after treatment, the law relating to conservancy and sewage.

Note.—Detailed instruction in (i) water supply and distribution, (ii) air supply, ventilation, cooling and heating, (iii) sites, environment, construction of buildings, and sanitary fittings, (iv) the collection, treatment, and disposal of sewage and other refuse, (v) nature, strength and fitness of structural materials employed in sanitary works, (vi) design of municipal, domestic, and other special sanitary works, (vii) mensuration and drawing in relation to elementary building construction and the construction and use of scales and plotting of land surveys and sections, will be given by the Lecturer in Sanitary Engineering, in a special course of lectures.

Food.—Classification of foodstuffs, nutritive functions and nutritive value of foodstuffs, quantity of food required, dietaries and their construction, diseases connected with food. Meat, fish, eggs, milk, butter, and other animal and vegetable fats, grains and cereals,

vegetables and fruit, sugar, bread, cheese, concentrated, prepared and preserved foods, the inspection and examination of food and foodstuffs, beverages and condiments, the law relating to foods and the prevention of adulteration.

Industrial Hygiene.—Offensive and dangerous trades and the resulting nuisances and methods of control, industries and factories, industrial areas and factory sites, smoke and dust nuisance, industrial poisoning, disabilities and diseases due to industries and trades, the law relating to factories and dangerous and offensive trades.

Epidemiology and Infectious Diseases.—The nature and origin of infectious diseases, immunity and protection, causes and modes of spread of epidemics and epizootics, contagious diseases and diseases arising from insanitary conditions, the study of the more common, infectious and epidemic diseases, *e.g.*, cholera, small-pox, plague, relapsing fever, typhus fever, beri-beri, chicken-pox, diarrhoea and dysentery, enteric fevers, hydrophobia, influenza, kala-azar, leprosy, malaria, malta fever, measles, cerebro-spinal fever, dengue, pneumonia tuberculosis, tetanus, yellow fever, puerperal pyaemia and certain diseases of animals which may be transmissible to men, *e.g.*, anthrax, foot and mouth disease, glanders rabies, trypanosome infections. The prevention of infectious disease. The law in relation to infectious disease.

Note.—A special course of lectures on the natural history of the common epidemic diseases of India and more especially of South India, and on the practical applications of the above principles to the control of infectious diseases in the Presidency, will be delivered by an Assistant Director of Public Health. Another course of lectures on the diseases of animals, etc., will be delivered by a Veterinary Officer.

Medical Inspection of School Children and School Hygiene.—The principles and methods employed; control of epidemic diseases in schools; school buildings, class-rooms, seats and desks, common rooms, staircases, tiffin rooms, hostels, playgrounds, ventilation, and lighting, heating and cooling, water-supply and sanitary conveniences, sites and locations.

Note.—Practical demonstrations of the above principles will be given by the Medical Officer of Health during his course of outdoor training.

Maternity and Child Welfare.—Infant mortality and maternal mortality, causes, and influences, maternity and child welfare schemes, child welfare centres, health visitors and midwifery services.

Note.—A special course of lectures on the conditions prevailing in the Presidency and the measures taken to meet them will be given by an Assistant Director of Public Health.

Demonstrations of the working of a maternity and child welfare scheme will be given by the Medical Officer of Health during his course of outdoor training.

Vital Statistics.—Population, census, estimates of population, registration of births, deaths, and marriages, calculation and correction of rates, causes of death, mortality and morbidity rates, influence of race, age, sex, migration, occupation, housing, season, climate, social and hygienic conditions, and diseases on the above. Life tables, the collection and interpretation of statistical data, determination of the value of statistical data, statistical methods, frequency curves, correlation, contingency, probability.

Note.—A special course of lectures on the above principles will be delivered by an Assistant Director of Public Health.

Practical Sanitation.—Public Health surveys, village sanitation, sanitation of camps, improvised methods, management of fairs and festivals, personal hygiene, the disposal of the dead. Disinfection by heat and chemicals, disinfecting stations, disinfestation, the law relating to disinfection and burial.

Note.—A special course of lectures on the management of fairs and festivals in the Presidency will be delivered by an Assistant Director of Public Health.

Vaccination.—Shall consist of a course of special lectures, demonstrations, and practical work in the preparation, standardisation and testing of vaccine lymph, vaccination and verification of results, the law and procedure in the Presidency, vaccination returns and statistics. Small-pox in the Presidency and its control.

Tuberculosis.—Shall consist of a special course of lectures on the practical aspects of tuberculosis, dealing with its etiology, pathology, diagnosis, prophylaxis and treatment, especially directed to its clinical and preventive sides, the control of tuberculosis, tuberculosis institutions, administration. Demonstrations to be given by the Superintendent of the King Edward Memorial Tuberculosis Institute.

Venereal Diseases.—Shall consist of a special course of lectures and demonstrations on the practical aspects of the prevention of venereal disease, to be delivered by the Medical Officer in charge of the Venereal Wards of the General Hospital.

Town Planning.—Shall consist of a course of special lectures on town planning to be delivered by the Director of Town Planning.

Infectious Diseases.—Shall consist of a course of lectures, clinics, and demonstrations at the Hospitals for Infectious Diseases, Madras, on the diagnosis and management of infectious diseases, and the administration of infectious diseases hospitals, to be delivered by the Superintendent of the Hospitals.

Instruction in Public Health Administration.—Will be given by a Medical Officer of Health approved by the Syndicate of the University of Madras, during the Spring and Vacation Terms as provided for in the Regulations above. It will include instructions on the relationship of the Health Officer with the local Authority and with the General Medical Practitioner, the operation of the various acts in everyday practice, the routine practice of conservancy, sanitation, control of infectious diseases, inspection of foods, and dangerous and offensive trades, inspection of plans, sites, buildings, schools, insanitary areas, and all the other duties that a Health Officer may be expected to perform.

APPENDIX XVI.

B.Sc. (PHARMACY) DEGREE EXAMINATION.

SYLLABUS.

Preliminary.

1. GENERAL CHEMISTRY.

Theoretical.—

THE LAW OF MASS ACTION.

Opposing reaction—Chemical equilibrium and its dynamic nature —the Law of Mass Action and its application to Dissociation of Ammonium Chloride and esterification of ethyl alcohol with acetic acid—Heterogeneous equilibrium—dissociation of Calcium Carbonate—Partition Law—Le Chatelier's principle.

GENERAL PROPERTIES OF SOLUTIONS.

Solubility of gases in liquids: solubility of liquids; critical solution temperature; vapour pressure of binary mixutres. The constant boiling mixture; distillation of mixtures of immiscible liquids.

SOLUTIONS OF SOLIDS IN LIQUIDS.

Saturated and super-saturated solutions; solubility curves—Influence of temperature on solubility: Eutectic mixtures. The surface tension of solvent affected by the dissolved substance—Oil-in-water emulsions and water-in-oil emulsions.

OSMOTIC PRESSURE.

Diffusion of dissolved substances—semipermeable membranes and how they act—Vant Hoff's theory of dilute solutions; relationship between osmotic pressure and vapour pressure of solutions: elevation of the boiling point—Landsberger's apparatus; depression of the freezing point—Beckmann's freezing point apparatus—comparison of osmotic pressures by plasmolytic and haemolytic methods.

SOLUTIONS OF SALTS, ACIDS AND BASES.

Evidence of dissociation in solutions; Ionic theory; properties of ions; conductivity of solutions—specific, molecular and equivalent

conductivities; Equivalent conductivity at infinite dilution; Degree of ionisation; Ionic conductivities; Ionisation of weak electrolytes such as acetic acids; the Law of Mass Action as applied to weak electrolytes.

Ionisation constant of water. Hydrogen ion concentration—the meaning of (H) and pH—the change in the pH at the neutral point when titrating a strong acid by a strong alkali, and a weak acid by a strong alkali—the theory of indicators—Buffer solutions—the determination of pH with the help of buffer solutions by the comparator method.

COLLOIDS.

Colloidal state compared with matter in mass and matter in the molecular state; examples of colloidal systems; sols and gels; lyophobic and lyophilic systems; general methods of preparation of colloids by dispersion and condensation methods with examples; separation of colloids from crystalloids by means of membranes; examples of such membranes and methods of preparing them; ultrafiltration; Tyndal phenomenon Ultramicroscope; Brownian movement; Cataphoresis; action of electrolytes on colloidal systems; mutual precipitation of colloids; emulsoid sols; protective colloids; gold number; formation of gels; osmotic pressure of colloids; emulsions—their properties—types of emulsions—emulsifying agents—de-emulsification—theories of emulsification; adsorption—mechanical and electrostatic adsorption; adsorption isotherm—M/X=Kc—applications of adsorption.

CATALYTIC PHENOMENA.

Characteristics of catalytic actions—homogeneous and heterogeneous catalysis; auto-catalysis; catalyst poisons; the optimum working conditions for catalytic reactions; mechanism of catalysis.

Practical Examination.

Candidates will be expected—

to prepare simple inorganic salts;

to identify a simple inorganic salt containing not more than one acid and one base;

to perform simple quantitative exercises, such as the determination of the amount of water in a substance or of the amount of ash left on the ignition of a substance;

to perform any easy gravimetric estimation, for example, a sulphate as $BaSO_4$, carbon dioxide by direct weighing, chloride as AgCl, Calcium as $CaSO_4$ and Iron as Fe_2O_3:

to prepare and use in simple volumetric estimation standard solutions of acids, alkalis, permanganate, iodine, thiosulphate and silver nitrate; and

to determine the approximate hydrogen-ion concentration of a given solution by means of indicators.

2. ORGANIC CHEMISTRY.

The ultimate analysis of organic compounds and estimation of carbon, hydrogen, nitrogen, sulphur, phosphorus and the halogens.

The determination of empirical, molecular, and structural formulae, and of molecular weights of organic substances.

The constitution and most important reactions and relationships of the following compounds or groups of compounds, illustrated in each case by a reference to a few of their most important members.

Paraffins, Unsaturated hydro-carbons. The different classes of alcohols and their derivatives. Halogen and nitro derivatives of the hydro-carbons. Aldehydes. Ketones, Acids, simple ethers. Esters. Amines. Amino-acids. Amides. Cyanides. Urea. Glycerol.

Benzene, toluene and their simple derivatives. Phenols with special reference to phenol, pyrocatehol, resorcinol, quinol and pyrogallol. Benzyl alcohol, benzaldehyde, benzoic acid, salicylic acid, gallic and tannic acids, phthalic acids, phenolphthalien, glucosides and alkaloids.

A general elementary knowledge of fats and waxes, carbohydrates and proteins.

Practical Examination.

The determination of melting and boiling points. The detection of the following elements: Carbon, hydrogen, nitrogen, sulphur, phosphorus and the halogens.

Simple organic preparations, Ethyl Bromide, Chloroform, Iodoform, Ethyl acetate, Urea, Acetamide, Nitrobenzene, Aniline and Phenol.

Identification of simple organic substances, *e.g.* methyl alcohol, ethyl alcohol, formaldehyde, acetone, common acids, glucose, cane sugar, phenol, salicylic acid, aniline, urea.

The determination of the saponification value and iodine value of a fat or an oil.

3. BOTANY.

The distinctive properties of living and non-living matter.

The difference between animals and plants.

The nature and properties of protoplasm.

The structure of the cell; cell division and gametogenesis.

Conjugation and fertilization.

The structure, life-history, and physiology of bacteria, fungi, spirogyra, angiosperms and ferns.

The distinctive characters of the classes dicotyledons and monocotyledons, and of their principal divisions.

The characters (including general properties) of the following natural orders to be recognized upon fresh specimens (and the distribution to be stated) with special reference to medicinal plants.

Papaverceae.	Compositae.
Cruciferae.	Apocynaceae.
Malvaceae.	Labiatae.
Leguminosae.	Solanaceae.
Rosaceae.	Euphorbiaceae.
Myrtaceae.	Coniferae.

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Palmaceae.	Cucurbitaceae.
Liliaceae.	Umbelliferae.
Gramineae.	
Filices.	Rubiaceae.
Rutaceae.	Asclepiadaceae.

Practical Examination.

The candidate must be prepared to—

(1) examine, describe, dissect, and make preparations both macroscopic and microscopic, of plants or parts of plants included in the foregoing schedule;

(2) refer to their appropriate systematic position plants or parts of plants comprised in the foregoing schedule;

(3) show a practical knowledge of the methods and apparatus used for demonstrating the main facts of the physiology of plants.

4. PHYSIOLOGY.

The candidate must possess an elementary knowledge of the following:—

The structure of the blood including enumeration of red cells; coagulation; the transport of oxygen and carbon dioxide.

The properties of cardiac, striated and unstriated muscle.

The mechanism of the heart and valves. The coronary circulation. Effect of inflow and rate on the output of the heart. The nervous control of the heart and the function of the carotid sinus.

The importance and maintenance of the blood pressure. The control of the blood supply to the organs of the body.

The mechanism of respiration and its control; action of vagus: the effect of (1) oxygen, (2) carbon dioxide, (3) nitrogen, and (4) carbon monoxide.

Physiology of the alimentary tract including a knowledge of the control of salivary, gastric, pancreatic and biliary secretion and of the movements of the alimentary tract. The chemistry of the common food substances, meat, eggs, milk and bread and the properties of the digestive juices and bile.

The physiology of the skin, loss of heat and sweating, the kidney including the chemistry of urine. Detection and estimation of the principal, normal and abnormal constituents of urine.

Nerve cells and fibres. The synapse. Spinal reflexes.

Function of medullary centres. Effects of removing the cerebrum. Motor cortex and pyramidal tracts. Function of corpus striatum. General arrangement of fibres entering and leaving the spinal cord including the sympathetic chain and the peripheral connections of the vagus and sympathetic nerves.

The physiology of mammalian reproduction including the implantation of the fertilised ovum and the function of the placenta.

The structure of the glands of internal secretion, the effects following their removal and the properties of extracts prepared from them including (a) the pituitary body, anterior and posterior lobes, (b) the thyroid and parathyroid, (c) the pancreas, (d) the suprarenals, and (e) the testicles and ovaries.

Final.

1. PHARMACEUTICAL CHEMISTRY.

Theoretical.—

The candidate will be expected to show a knowledge of—

(i) the elements and inorganic compounds in use in Pharmacy; their preparation, properties and purification for pharmaceutical use;

(ii) chemistry of the main types of organic compounds used as drugs (including synthetic drugs and organometallic compounds), crystallisable hormones and vitamins;

(iii) the principles involved in the chemical analysis of drugs; and

(iv) Elements of chemotherapy.

Practical.—

The candidate shall show a practical knowledge of—

(i) The identification of ordinary chemicals used as drugs in the B.P.; the detection of impurities which they may contain.

(ii) The quantitative determination of the active constituents in drugs and pharmaceutical preparations mentioned in the B. P. that are amenable to chemical assay and of arsenic and lead occurring as impurities in drugs.

2. PHARMACEUTICS.

Theoretical.—

The candidate will be expected to show a knowledge of the following:—

(i) The principles involved and the apparatus used in pharmaceutical operations in general use; general methods of manufacture of the common galenical preparations; the interpretation of prescriptions; Posology.

(ii) The principles involved in sterilization and preparation and preservation of sterile solutions for hypodermic injection: the preparation of medicated surgical dressings; Antiseptics and disinfectants.

(iii) The preparation and standardisation of serums, vaccines, hormones and vitamins; the biological methods of standardisation of galenicals.

(iv) Action of the following drugs :—

Chloroform, ether, alcohol, bromides, hyoscine, atropine, morphine, strychnine, caffeine, digitalis, nitrites, acetyl-salicylic acid.

(v) The general mode of action of bitters, purgatives, emetics and expectorants, astringents, antacids.

(vi) The laws and rules affecting the traffic in drugs and poisons.

Practical.—

The candidate will be expected to be acquainted with ordinary pharmaceutical operations such as dispensing and the making of the galenical preparations in the B.P.; the making of sterile preparations and the general biological methods of standardisation of galenicals.

3. PRACTICAL PHARMACOGNOSY.

The candidate must be prepared—

(i) to identify in the entire condition, crude drugs of vegetable or animal origin described in the B.P.;

(ii) to prepare for microscopical examination the following vegetable drugs, to describe their structure and to identify and describe their powders:—

Leaves: Senna, buchu, coca, stramonium, foxglove, belladonna, henbane, tobacco, betel.

Woods: Pine, quassia, sandal.

Flowers: Saffron, Indian hemp.

Roots: Jalap, gentian, liquorice, belladonna, ipecacuanha.

Rhizomes: Ginger, turmeric, rhubarb.

Stems: Lobelia.

Barks: Cinnamon, Cassia, cascara, cinchona, cork.

Seeds: Mustard, linseed, castor, croton, areca, nux vomica.

Fruits: Cardamom colocynth, pepper, chillie, ergot.

Starches: Maize, wheat, barley, rice, potato.

(iii) to examine fibres and fabrics used for surgical dressings.

List of books recommended.—

1. A Text-book of Pharmacognosy by Greenish.
2. The Microscopical Examination of foods and *drugs* by Greenish.
3. Practical Pharmacognosy by Wallis.
4. Text-book of Pharmacognosy by Trease.

APPENDIX XVII.

Syllabuses for the B.Sc. (Nursing) Degree Examination.

(1) ENGLISH.

The English course has been planned on new lines. English has been thought of not as one subject, distinct from the others, to be dealt with and dismissed, but as an integral part of the whole educational process and an instrument for the furtherance of its aims. Thus composition has been aligned to practical purposes. Prose texts have been chosen not purely for their intrinsic literary qualities, (commonly beyond the students' appreciation), but because they express stimulating ideas in good modern English. The aim is to make students read worthwhile books for what they can find there, not concern themselves with graces of style. Most of the books have a bearing on the wider issues of the Nursing profession, thus assisting the integration of the Course while helping to liberalise the mind. The discussion method should be used. No detailed work is required.

To effect the aims of the English Course, it is essential that reliance be not placed on local resources for the supply of books, but that early steps be taken to get them in sufficient numbers from abroad. As the books are to be read and discussed, not studied in detail, it may not be necessary for each student to have copies.

First 2 years to be followed by the Preliminary examination.

Time: 3 periods a week for each of the 6 terms. Total 216 periods.

Aims: 1. To learn to write effectively in the capacity of a nurse.

2. To gain a love of reading.

3. To widen the mind by a pleasant introduction to things that matter specially to a nurse.

The course shall consist of Composition and the reading of Poetry, Drama and Prose. No detailed study is required. Modern books to be chosen within the bounds of student's appreciation, and some of them having a bearing on the wider aspects of the Nursing Profession.

Composition.—A thorough training in the art of writing, based on instruction on the nature of the Sentence, the Paragraph, the Essay. Practice to be given in expansion and precis writing. Unity, coherence and emphasis to be stressed throughout.

Practical application.—Instruction and practice shall be given in logical, concise and lucid expression with reference to the various written transactions a senior nurse or nursing superintendent may be called upon to perform. These will include:—

Letter Writing.—Letters to Government, to Boards, Doctors, Municipal Chairmen, replies to advertisements, applications for posts, etc.

Reports.—Testimonials, work of student nurses, particular occurrences, annual reports, etc. Drawing up of *Nursing Schemes*, programmes, etc.

Poetry and Drama.—About 2,000 lines of poetry.

Palgrave's Golden Treasury may be used for the lyric poetry, the rest to be of about the same standard as Intermediate Poetry.

Light Drama.—*Two plays* selected from One Act Plays of To-day in 6 volumes. Suitable ones are:—

The Little Man	...	by John Galsworthy.
Night Watches	...	,, Allan Monkhouse.
Followers	...	,, Harold Brighouse.
Becky Sharp	...	,, Olive Conway.
It's the poor that 'elps the poor.		,, Harold Chapin.
The Lovely Miracle	...	,, Philip Johnson.

Prose.—4 novels, 2 Clsssical and 2 Modern, 1 Biography, 1 book dealing with human progress in any sphere, uplift, exploration, medical science, etc.

Suitable Novels.

Classical:

Charles Dickens	...	Martin Chuzzlewit.
		Nicholas Nickleby.
		Oliver Twist.
Jane Austen	...	Any of the 6 novels.
George Elliot	...	Adam Bede.
		The Mill on the Floss.
Charlotte Bronte	...	Jane Eyre.
		Shirley.
Mrs. Gaskell	...	Cranford.

Modern:

H. G. Wells	...	Kipps.
		The History of Mr. Polly.
		Love and Mr. Lewisham.

John Buchan	...	Greenmantle. Thirty-nine steps.
Conon Doyle	...	The White Company. The Fortune of Nigel.
Rider Haggard	...	She. King Solomon's Mines.
Countess Russell	...	Elizabeth and her German Garden and others.
Phyllis Bottome	...	Mortal Storm.
Mary Borden	...	Jane our stranger.
Margaret Irwin	...	None so pretty.
Olive Schreiner	...	Story of an African Farm.
Arthur Greenwood	...	Love on the dole.

Biography:

Helen Keller	...	Autobiography.
The Microbe Hunters	...	Paul de Kruif..
Reminiscences of Linda Richards.		Linda Richards.
Florence Nightingale	...	Irene Cooper Wallis.
St. Francis of Assisi	...	G. K. Chesterton.
Seven Inventors	...	Henry Mcnicol (Oxford University Press).
Six Reformers	...	John Walton (Oxford University Press).
Rooseveldt	...	Compton Mackenzie (Harrap).

Human Progress:

Voiceless India	...	Gertrude Emerson.
Our India	...	Masani.
Socrates in an Indian Village.		F. F. Brayne.
Nurses on Horseback	...	Ernest Poole.
Socrates persists in India	...	F. L. Brayne.
Essay on the Cultivation of India, China and Japan.		Lowes Dickinson.
Footprints on the Sands of Time.		F. G. Pierce.
Great People of the Past	...	Rhoda Power.
Quest and Conquest	...	Malcolm Bar (Oxford University Press.)
Beyond the Sunset	...	J. Boog Watson (Oxford University Press.)

Intermediate Examination in Science in Nursing.

Selections for the Examination of 1949.

Poetry:

Matthew Arnold: Sohrab and Rustum.

Wordsworth: The Leech Gatherer.

Tennyson: The Lady of Shallott.

The following selections from Palgrave's Goldren Treasury:—

Marlowe: The Passionate Shepherd to his Love.

Shakespeare: True Love (Sonnet); "Let me not to the marriage of true minds."

Drayton: Love's Farewell (Sonnet).

Milton: On his Blindness; L'Allegro; Il Penseroso.

Wordsworth: Daffodils.

Keats: Ode to Autumn.

Shelley: Ode to the West Wind.

Drama:

Shakespeare: Midsummer Night's Dream.

Galsworthy: The Little Man.

Arnold Bennett: The Step Mother.

Novel:

Classical:—

Charlotte Bronte: Jane Eyre.

Dickens: Oliver Twist.

Modern:

H. G. Wells: The History of Mr. Polly.

Buchan: Thirty-nine Steps.

Biography:

Helen Keller: Autobiography.

Human Progress:

F. L. Brayne: Socrates in an Indian Village

THIRD AND FOURTH YEARS.

B.Sc. (Nursing) Degree Examination.

Time: 2 periods a week for the first year.
1 period a week for the second year.

Aims: 1. To train the student in correct and lucid expression of her own ideas.

2. To accustom her to make use of books and libraries for pleasure and profit.

3. To interest her in the wider aspects of Nursing through its interpretation in literature.

The course shall consist of Composition and a discussion under guidance of the more important topics suggested by, or arising from an intelligent study of the books prescribed. These will include two novels of ideas, one biography and one or two books dealing with Sociology, women's progress, advance of medical science, etc.

Books recommended:

Bennett: The Old Wives' Tale.

Pearl Buck : The Good Earth.

Sir Edward Cook: Florence Nightingale.

Winifred Holtby: Women.

Hoyland : History of Civilization.

A good book dealing with the principles of English Composition, *e.g.*, Matriculation English Course by Low and Hollingworth (University Tutorial Press, London) may also be prescribed.

(2) ANATOMY AND PHYSIOLOGY.

General Biological Principles:

Chief characters of living organisms. Protoplasm-Structure and properties. Structure of cells (Amoeba as example).

Cell division. Organisation of cells.

Physiology of cells-Movement, Irritability, Respiration, Nutrition, Excretion, and Reproduction.

Structure and Physiology of a multicellular organism *e.g.*, frog, treated in a general way.

Evolution treated in an elementary manner.

I. *The body as an integrated whole:*

1. The whole body and its different systems.
2. The general framework of the body—Epithelial and connective tissues.

II. *The Erect and Moving body:*

1. The skeletal system.
2. The articulatory system.
3. Muscular tissue. Study of gross and microscopic structure of skeletal muscle.
4. The Physiology of muscle—Irritability, Contraction, Muscle tonus, Chemical changes in muscle during contraction and recovery.
5. The skeletal muscles.

(*a*) Anatomical considerations.

1. The origin, the insertion, the nerve supply and the blood supply of a given muscle.
2. Its action.
3. The arrangement of muscles in groups.

(*b*) The main groups—the muscles which move the head, the back and loins—the muscles acting on the scapula, the humerus, the forearm, the hand, the femur, the leg, and the foot—the muscles of respiration.

III. *Maintenance of the activity of skeletal muscle:*

1. (*a*) Composition and functions of blood, lymph and tissue fluids. Blood counts. Coagulation of blood.

(*b*) The anatomy and physiology of the circulatory system as applied to:—the heart; the arterial system; the capillaries; the venous system; the pulmonary circulation *vs.* the systemic circulation; the factors concerned in the maintenance of blood pressure; the pulse and factors influencing it; the blood supply to active muscle.

Explanation of hyperaemia and ischaemia.

2. The anatomy and physiology of the Respiratory System:
    1. The anatomy of the thoracic cage.
    2. The anatomy of the lungs.
    3. The mechanism of respiration.
    4. The control of respiration—nervous and chemical.
    5. External and internal respiration.
    6. Response of the Respiratory Centre to increased muscular activity.

3. The anatomy of the alimentary canal and its associated glands.

   The physiology of the alimentary canal. Movements; process of digestion; process of absorption.

   Nourishment of skeletal muscle.

4. Effect of muscular exercise on the Respiratory and Circulatory Systems.

IV. *Metabolism of the body* :

1. Metabolism of carbohydrates, fats, proteins, inorganic salts and vitamins.
2. Waste products of metabolism—urea, uric acid, creatinine, and ammonium salts.
3. The Excretory system.
    (*a*) The anatomy and physiology of the skin.
    (*b*) The anatomy of the urinary tract.
    (*c*) The physiology of the kidneys.
4. Regulation of body temperature.
5. Endocrine glands—Pituitary, thyroid, parathyroid, pancreas, supra renal and thymus.
6. Metabolic rate.

V. *Reproduction of the human body*:

1. Prenatal development of the body.
2. Male reproductory system.
3. Female reproductory system.

VI. *Integration and control of the body by the nervous system* :

1. The nervous system.
2. The nervous impulse.

3. The spinal cord.
4. The reflex arc.
5. The Brain—its parts and functions.
6. The cranial nerves.
7. The autonomic nervous system.
8. Sensory end organs and sensations.

Anatomy and Physiology—Practical.

1. Microscopic study of—

    (1) epithelial cells from the lining of the cheek, and

    (2) of any plant cell showing protoplasmic movement.

    (3) Observation of amœba and paramecium.

2. Simple dissections on frogs to show—

    (*a*) viscera and their relations.

    (*b*) the circulatory system.

    (*c*) the urogenital system.

3. Histological demonstrations—

    (*a*) Simple squamous cells from the mouth—students to add nuclear stain.

    (*b*) Stratified squamous epithelium.

    (*c*) Histology of connective tissue—white fibrous connective tissue, cartilage, bone.

4. Study of the skeleton :

    (*a*) Examination of the bones including external features and internal structure.

    (*b*) Examination of different types of joints.

    (*c*) Movements pertaining to these types.

5. Demonstration of gross and microscopic structure of skeletal muscle.

6. Demonstration of the muscle nerve preparation of the frog to show ·

    1. phenomenon of contraction.
    2. phenomenon of fatigue.

7. Demonstration of main muscle groups in the cadaver.

8. Demonstration of surface anatomy on living body.

9. Blood :

(*a*) Examination of red cells.

(*b*) Examination of white cells.

(*c*) Observation of coagulation of blood.

(*d*) Determination of clotting time.

(*e*) Estimation of Haemoglobin.

10. Circulatory system :

(*a*) Anatomy of sheep's heart.

(*b*) Observation of heart-beat in the frog.

(*c*) Use of stethoscope to note human heart sounds.

(*d*) Circulation in the frog's web.

(*e*) Histology of medium sized artery.

(*f*) Pulse count (1) at rest, (2) after exercise.

(*g*) Demonstration of blood pressure determination in man.

11. Respiration :

(*a*) Demonstration of anatomy of trachea and lungs in fresh specimen of sheep.

(*b*) Mechanism of respiration in Hering's apparatus.

(*c*) Measurement of vital capacity.

(*d*) Measure of minute ventilation (1) at rest, (2) after exercise.

12. Digestion :

(*a*) Observation of alimentary canal in the dissecting room.

(*b*) Observation of peristaltic movements in the frog's stomach.

(*c*) Observation in X-Ray room of peristaltic movements after barium meal in human.

(*d*) Demonstration of glucose in intestinal digest of carbohydrate by Benedict's test.

(*e*) Study of portal system in the cadaver.

13. Excretory system :

(*a*) Demonstration of urea in urine.

(*b*) Demonstration of gross and microscopic structure of the kidney.

(c) Measurement of volume of 24 hour urine.

(d) Histology of the skin.

14. Maintenance of body temperature :

(a) Taking of temperatures at rest for six mornings.

(b) Taking of temperatures after heavy exercise.

15. Endocrine glands :

Demonstration on experimental animals of effect of injection of pituitary extract, pitocin, adrenalin, and insulin.

16. Determination of metabolic rate on a student.

17. Reproduction :

(a) Study of fœtus in the utero in the museum.

(b) General anatomy of the male reproductive tract.

(c) General anatomy of the female reproductive tract.

(d) Microscopic appearance of the sperm and of the ovum.

(e) Microscopic study of cell division.
Mitosis. Reduction division.

18. Nervous System :—

(a) Demonstration of slides showing nerve cell and nerve fibre.

(b) Dissection of the frog to show the main parts of the brain.

(c) Demonstration of the parts of the human brain.

(d) Dissection of the ox eye.

(e) Study of a model of the bony labyrinth.

(f) Demonstration of reflexes in man.

(g) Snellen test type.

(h) Tests for light touch appreciation.

Text-Book—Human Anatomy and Physiology by Millard and King, Publishing House. W. B. Saunders Company, Philadelphia and London, 1942 edition.

Reference Books—1. The Living Body by Best and Taylor, Chapman & Hall, Ltd., 11 Henrietta Street, W. C. 2, London.

2. The Machinery of the Body by Carlson and Johnson.

(3) CHEMISTRY & (4) PHYSICS.

Chemistry.

120 hours. { 60 hours. Theory lectures. 60 hours. Laboratory work.

Inorganic Chemistry—

Oxygen. Hydrogen. Water.

Physical and chemical changes.

Laws of chemical combination.

Atomic theory—development including elementary ideas on the structure of atom, etc.

Chemical nomenclature. Valency. Formulae. Equations.

Nitrogen, air.

Solutions, diffusion, osmotic pressure, colloidal solutions.

Acids, bases and salts. Ionisation.

Halogens : Sulphur, Phosphorus, Carbon, Silicon and Boron.

Metals and their salts. Sodium, Potassium, Copper, Silver, Calcium, Barium, Magnesium, Aluminium, Iron.

Organic Chemistry—

Hydro-carbons and halogen derivatives.

Alcohols, ethers, aldehydes and Ketones.

Organic acids, esters, amines and aminoacids.

Cyclic Compounds.

Physiological Chemistry—

Carbohydrates—Fats—Proteins—Vitamins—Mineral Salts.

Chemistry of digestion—Metabolism.

Blood and lymph.

Urine and faeces.

Text-books:—

Fundamentals of Chemistry, Fifth edition. L. T. Bogert (W. B. Saunders Co.) The above is recommended as the text-book omitting Ch. XXVIII. (Endocrine Glands and Hormones).

Laboratory Work:—

Selected exercises from Bogert's Laboratory Manual of Chemistry, 4th edn. (W. B. Saunders Company).

Physics.

24 hours. Lectures and Demonstrations.

Introduction. Units and measurements—vernier.

Forces and motion. Levers, pulleys.

Gravitation, pressure and thrust. Density, specific gravity.

Atmospheric pressure—Barometer, pumps, pressure gauges, syringe, syphon, etc.

Elementary ideas of surface tension and viscosity.

Elementary principles and nature of heat, units of measurement. Convection, conduction and radiation. Thermometers, humidity.

Lenses. Camera, eye, microscope.

General idea of sound—wave form. Interference of sound waves. Stethoscope.

Nature of electric current. Laws of magnetism.

Electro-magnetic induction. Units in electricity. Cells. Difference between A. C. and D. C.

Books for Reference:—

Bodansky, Meyer. Introduction to Physiological Chemistry, 4th edn. John Wiley & Sons., Inc., New York, 1938.

Cameron, Alexander Thoma. Text-book of Biochemistry, 5th edn. Macmillan, 1938.

Findlay, Alexander. Spirit of Chemistry, 2nd edn. Longmans, 1939.

Trevers, Charlotte and Morse, E. E. Fundamentals of Chemistry and Application. Macmillan, 1939.

Kendall, James. Smith's Introductory College Chemistry, Appleton Century, 1938.

Kimball, Arthur L. College Text-book of Physics; 5th edn. Holt, 1937.

Lynde, Carleton John. Everyday Physics. Macmillan, 1930.

Lowry, Alexander and Harrow, Benjamin. Introduction to Organic Chemistry, 4th edn. Wiley, 1936.

Norris, James Flack. Principles of Organic Chemistry, 3rd edn. McGraw Hill, 1931.

(5) MICROBIOLOGY AND PATHOLOGY.

Section 1—

General Principles:

1. General Lecture on Micro-Organisms.
2. Methods of Laboratory Study of Micro-Organisms.
3. Discussion of certain Micro-Organisms, molds, mildews, yeasts, pencillium, mushrooms; cocci, spirilum, rod-shaped bacilli, spore-forming rods.
4. Saprophytic bacteria; putrefaction; the septic tank; saprophytic infections; protection of wells from contamination; protection of foods from micro-organisms.
5. Distribution of bacteria in human beings. How bacterial infections spread.

Section 2.—

Detailed Study of some of the important micro-organisms.

1. Pathogenic Yeasts—mode of growth, reproduction and dispersal.
2. Simple study of organisms causing thrush, blastomycosis, ringworm, ergot of rye.

Practical Work on the above Sections:

1. Demonstration of bacterial cultures, method of taking smear from a culture, staining it and examining it under microscope.
2. The correct method of taking smear from the throat of a patient; from the nose; from an ulcer; taking a blood culture.
3. Preparation and microscopic study of yeasts by students.

   Study of mold, *e.g.* Mucor under the microscope.
4. Demonstration of the organism causing ringworm.

   The correct method of taking a slide of ringworm from a living person.

Section 3.—

Asepsis, Disinfection and Sanitation.

Disinfection and sterilization:

1. Definitions of disinfection and of sterilization. Discussion of the mechanism of each. Methods of sterilization.

2. Character of disinfectants, their strength, special uses of, as for example, disinfection of formites.

3. Bacteriostasis: definition and means of achieving.

4. The sterile field—asepsis—the nurse's responsibility.

5. Disease transmission and ward sanitation.

   (*a*) Bacteria cast off from the body.
   (*b*) Transfer of bacteria.
   (*c*) Disinfection in infectious diseases; concurrent terminal, practical application to ward nursing.

6. Food sanitation—(*a*) Diseases caused by Bacteria in food *e.g.*, paratyphoid botulism, staphylococcal infection, ptomaine poisoning (*b*) Protection against food infection and food poisoning as cleanly preparation of and cleanly serving of food, rigid control of milk production, distribution, and rigid care in its use in the home; protection of household water supply; care of utensils concerned with food.

***Practical work on Section* 3.—**

1. Demonstration of chemical disinfection.

2. Demonstration of sterilization of surgical linen.

3 Demonstration on wards of disinfection of excreta and of linen from a typhoid case.

4. Demonstration in the Operating Room of preparation of a sterile field.

5. Cultures for pathogenic bacteria frem students' hands after a Surgical scrubbing.

6. Practical Demonstrations in the ward of coucurrent, terminal, disinfections.

7. Demonstration of plating from samples of milk.

***Section* 4.—**

Infection Immunity, Allergy.

1. Infection:—(*a*) Portals of entry. (*b*) Virulence-variations in. (*c*) Toxins-exotoxin, endotoxin. (*d*) Viruses: small-pox, common cold, rabies.

2. Resistance, the defences of the body; (*a*) Mechanical-the coverings of exterior of the body and of the internal passages, and its secretions. (*b*) Inflammation. (*c*) Phagocytosis. (*d*) Antibody formation.

3. Natural immunity; definition, species immunity, racial immunity, individual immunity, active natural immunity compared with artificial immunity.

4. Antigens and Antibodies: definitions and examples; specificity of antibodies; amboceptors and complement; fixation of complement; Wassermann test; precipitins; agglutinins-use in diagnosis.

5. Artificial immunity; definition of active and of passive artificial immunity; method of acquiring artificial immunity by active method, as vaccination, Pasteur treatment for rabies, by use of dead bacteria, by use of bacterial exotoxins.

   Passive immunity; use of ready-made antibodies in therapeutic sera, *e.g.* tetanus antitoxin, diphtheria antitoxin, preparation of sera. Nature of passive immunity.

6. Hypersensitiveness: definition of allergy and anaphylaxis, with examples of each. Pollen allergy: food, bacterial, allergy. Test for allergy.

Practical work on Section 4.

1. Class volunteers to be submitted to the Mantoux Test and the results evaluated.
2. Demonstration of the Wassermann test.
3. Whole class to be inoculated against typhoid fever and agglutination reactions demonstrated before and after.
4. Demonstration of Widal test on suspected typhoid case.
5. Demonstration of anaphylaxis in the guinea pig.
6. Demonstration of serum rash or any example of allergy on the wards.
7. Demonstration of tests for allergy.

Section 5.

Introduction to General Pathology.

1. Definition of disease, pathology; classification of pathology as structural (gross microscopic) chemical, clinical.

2. Classification of five great pathological groups: degenerations, inflammations, infections, new growths, congenital malformations.

   Simple definition of each state, with examples.

3. Degenerations; causes of, and degree of; the reaction of the body to degenerations.

4. Inflammations; the classical picture of a simple inflammation; abscess formation: phlegmon and lymphangitis.

5. Infections; local infections; bacteraemia *versus* septicaemia; sepsis.

6. New growths: benign *versus* malignant *e.g.*, benign polypus, adenoma, lipoma; malignant carcinoma and sarcoma.

7. Congenital Malformations: examples of; the albino, the congenital heart.

Practical work on Section 5—

1. Demonstration of pathological specimens with the normal submitted for contrast (*a*) cor bovinum, (*b*) tuberculous knee joint.

2. Demonstration of pathological specimen showing examples of each main class; degenerations, inflammations, infections, new growths, congenital malformations.

3. Study of a gangrenous limb in the ward.

4. Inflammation in the web of the frog's foot or in frog's mesentery.

5. Careful study of gross pathology of an abscess; of a healing wound, non-septic.

6. Blood culture from a case of puerperal sepsis.

7. Study of wound infection.

8. Demonstration in wards on a lipoma.

9. Demonstration in wards on an adeno-carcinoma.

10. Demonstration in wards on a sarcoma.

    Study of gross pathology of each with reference to the microscopic picture.

11. Any congenital malformations found in the wards.

(6) NURSING AND ALLIED ARTS.

I. *Orientation of the student to Nursing and the Nursing School:*

Definition of nursing; the purpose of all nursing; the spirit, ideals and desirable points of view and attitudes.

History of nursing showing how the modern conception has been derived from groups of health workers in the Pre-Christian period, from nursing leaders through the centuries to the present day.

Orientation of the student to the School of Nursing through the historical approach. The nursing schools of India as they are to-day, their history and development.

The students' place in the local school, its traditions, etc.

Relationship with fellow students, professors, clinical supervisors, etc.

Essential qualities in students of nursing.

Relationship of the school to the Medical College, to other colleges with which it may be affiliated and to the hospital.

Students of nursing and their relation to medical and other students.

Contribution of medical and nursing students to the medical training centre.

II. *Orientation of the student to the Hospital*:

Definition of a hospital. The functions of a hospital. The structure, situation and organisation of the hospital.

The students' responsibility to the nursing service of the hospital.

The students' relations with the medical and other staff of the hospital.

III. *Health*:

Definition of health (positive health of body, mind, spirit), appraisal of health and health needs.

The health approach in nursing, its importance and values—the responsibility of the nurse to be an example of healthful living. Individual health needs and adjustments with special application for the nurse in nursing situations.

The securing and conservation of health.

IV. *Control of the Environment*:

Health essentials in the environment. Influence of environmental factors on physical, mental and emotional state of the patient. Modifications of the environment in sickness.

Importance of ventilation, lighting and cleanliness.

V. *Care of the Environment*:

The ward unit, arrangement and equipment. Care of the ward and accessory rooms such as bathrooms, lavatories, linen rooms, kitchen, etc.

Care of equipment and supplies (*e.g.* beds, bedside tables, linen, mattresses, rubber goods, enamelware, glassware, etc.)

Disinfection of equipment and supplies. Special care of room and equipment after discharge or death of patient.

Care of food, refrigeration.

Disposal of waste. Removal of stains. Nurse's responsibility in maintaining cleanliness and order.

Preparation of various types of dressings, pads, bandages, binders, etc.

Wrapping of same for sterilization.

VI. *Providing for the Patient's personal needs.*

The patient as a person, assisting him to adapt to the hospital situation and routine.

Bed bathing and hair washing; routine morning and evening care, care of mouth. Treatment of pressure points. Care of hair, prevention of pediculosis, and treatment of same.

Bed-making for a patient who is not allowed to get up, changing of linen, lifting and rolling the patient.

Providing for elimination of excreta, routine giving of bedpans and urinals.

Toilet of patient, removal of receptacle, inspection of contents, emptying, cleaning and disinfection of receptacles.

Feeding a helpless patient. Simple methods of artificial feeding by rectum, mouth and nose.

VII. *Providing for the Patient's Rest, Comfort and Recreation*:

Various positions. Methods of changing the position of a helpless patient. Importance of adjustment of pillows, sand bags, air rings, cradles, etc. Importance of introducing various types of handicrafts, literature, games for the patients. Adaptation of same to various stages of illness and to different types of personalities. Preparation of the patient for sleep. Use of the power of suggestion.

Massage, definition, history. Purpose in nursing. Use in relation to medication by inunction, use in connection with the patient's comfort and rest.

Methods, movements and technique of performing simple palliative massage. Exercises for patients while in bed.

VIII. *Observation and Recording of Symptoms*:

Importance of developing techniques of accurate, keen observation—Subjective and objective symptoms.

Temperature, pulse and respiration. Deviations from normal and principles underlying normal and abnormal conditions. Methods of taking, recording and reporting. Care of thermometers.

Charts, records and reports, use of and methods of writing up.

IX. *Physical Examinations and Diagnostic Measures*:

Necessity for presence of nurse, nurse's responsibility in assisting the patient and the doctor. Positions and draping.

Instruments necessary and their use, care of instruments.

Collection of specimens and despatch to laboratory; observation and recording in relation to specimens collected.

Recording of reports from laboratory.

X. *Simple Therapeutic measures*:

Local applications of heat and cold. Sponges, drainage, irrigation and medication of the colon (Enemata.) Vaginal douche. Irrigation and dressing of external genitalia.

Inhalations.

XI. *Bandaging*.

Definition, purpose and principles underlying the art of bandaging.

Types of bandages used such as roller, triangular, etc.

Kinds of bandages used as cotton, gauze, elastic, elastoplast, plaster, etc.

Methods of applying bandages to the various parts of the body and for the various purposes.

XII. *Admission and discharge of patient*:

Importance of the reception of the patient and helping the patient to adjust to the Hospital situation—removing fears and insecurity.

Preparation of bed, admitting bath. Observations of patient's condition and behaviour.

Care of clothes and valuables.

Preparation of patient for discharge and adjustment back to home situation, definite instructions for conducting of life during convalescence.

Closing of chart and transfer of chart to record room.

The duties of the doctor and the nurse to the dying patient.

The mental, spiritual and physical state of a dying patient.

How to relieve distressing symptoms of the various stages.

Care of the body after death. Last offices.

(7) PSYCHOLOGY.

Introduction:

(*a*) Definition of terms.

(*b*) Scope of Psychology; different types of psychology, psychological schools, and general scope of each.

The Physical Mechanisms of Human Behaviour (behind human behaviour):

(*a*) The sense organs and their functions (A. & K. IV.)
(*b*) The Nervous System and its relation to bahaviour (A. & K. V.)
(*c*) The Muscles and Glands (A. & K. VI.)

The Mental Mechanisms behind Human Behaviour.

(*a*) The levels of the mind (Psych. and Life Weatherhead IV.)
(*b*) The importance of the unconscious (Weatherhead V.)

The Regulation of Behaviour:

(*a*) The motivation of behaviour (A. & K. I, II, XIII & Weath. VI.)

(1) Physical factors.
(2) Mental factors (*e.g.*, instincts, emotions, attitudes.)

(*b*) Conflict, Adjustments and maladjustments (A. & K. III.)

(*c*) Sentiment, will, imagination and confidence (Weath. VII.)

How to Learn:

(*a*) How to learn efficiently (A. & K. VII.)
(*b*) Further principles and conditions of learning (A. & K. VIII.)
(*c*) The individual learner (A. & K. IX.)

Behaviour in specific Life Periods:

(*a*) Psychology of childhood (Weath. X, A. & K. X.)

(*b*) Psychology of adolescence (A. & K. XI.)

(*c*) Adult Psychology (A. & K. XII.)

Mental Hygiene. (On being a real person, Fosdick, entire book.)

The Nurse as Practical Psychologist (A. & K. XV.)

Texts:

Averil and Kempf: *Psychology applied to Nursing.*

Fosdick : *On being a real person.*

Suggested References :

Weatherhead: *Psychology and Life.*
Adler, Alfred: *Understanding Human Nature.*
Arlitt, Ada Hart: *Child from One to Twelve.*
Hadfield: *Psychology and Morals.*
Woodworth, Robert Sessions: *Psychology*, 4th ed.

(8) MEDICAL AND SURGICAL NURSING.

Introduction to Medical and Surgical Nursing.

The effect of disease on the body and mind—Tissue changes.

The process of inflammation and its resolution—Abscess formation, ulceration, sloughing and gangrene.

General and local infections (haemorrhage-Thrombosis Erysipelas, Cellulitis—Septicaemia—Pyaemia—Carbuncles).

Embolism—Shock—its causes and treatment.

Operative aseptic technique.

General principles of asepsis—Surgical cleanliness—Sterilization by heat and by antiseptics.

Pre-operative and post-operative care of patient.

Preparation of theatre with attention to light, heat and sound.

Preparation of equipment and of general instruments.

Anaesthetics and their effect—Dangers.

Spinal—General—regional—rectal, etc.—Nursing care of patients during and after anaesthesia.

Nursing in diseases of the Circulatory system.

Heart disease—Pericarditis—Myocarditis and Endocarditis—Valvular diseases—Failure of compensation.

Symptoms and nursing treatment.

Blood transfusion—Blood grouping—Serum and plasma.

Diseases of the blood and lymphatic system—Leukaemia—anaemias—Hodgkin's disease—Reynaud's disease—puerpera.

Nursing in diseases of the Respiratory system.

Medical aspect of diseases of the tonsils—larynx—trachea—bronchi and sinusitis—Bronchiectasis.

Surgical treatment of the same—Bronchoscopy.

Nursing care of above.

The Lungs—Pneumonias—Bronchial and lobar—Pleurisy dry and with effusion, empyema—lung abscess.—Artifical pneumothorax—thoroscopy.

Nursing care of the above with reference to health teaching.

Knowledge of special equipment and instruments.

Position of the patient with special reference to drainage.

Diseases of the Gastro-Intestinal tract.

Preparation for X-Ray of alimentary tract. Knowledge of Gastro-analysis.

Diseases of the mouth--throat and stomach—congenital deformities of the mouth, *i.e.* Hare lip and cleft palate—operations and nursing care of the same. Oesophageal stenosis—organic—chemical or Traumatic. Carcinoma—peptic ulcers.

Operations on the stomach—Gastrostomy—Gastrectomy.

Gastro-enterostomy—Nursing care and feeding of such patients.

Diseases of the Intestinal Tract—Enteric fever—Dysentery—Colitis—Herniae, appendicitis—Obstructions—Surgery of the Intestinal tract.

Nursing care in diseases and after operations of Intestinal tract.

Operations on the colon, rectum and anus—Nursing care in the same.

Diseases of the Urinary Tract.

Knowledge of Pyelography—Renal function tests and Cystocopy.

Diseases of the kidney—ureters and bladder—Calculi—Ptosis,

Operations of the kidneys—ureters and bladder—Nephritis—Hydronephrosis.

Nursing care in these cases.

Conditions of the musculo-skeletal system.

Fractures of the bones—types—knowledge of healing process.

Causes of fractures—Diseases of joints—Rheumatic fever—Gout—acute and chronic arthritis—Tuberculosis of bones and joints.

Surgical and medical methods of treatment.

Deformities of bones due to deficiency diseases.

Infantile paralysis.

Nursing care of Orthopaedic diseases—including traction on muscles—care of splints—plaster of Paris casing—diversional therapy and its value.

Rehabilitation of orthopaedic patients.

Diseases of the skin.

Diseases of the skin and their medical treatment—causes of same *e.g.* occupational—deficiency—allergic.

Burns and scalds—Skin grafting—Plastic operations.

Nursing care in skin conditions.

Erythema—Dermatitis—Herpes zoster—acne—scabies—ringworm—Impetigo—psoriasis—parasitic fingers.

Nursing in conditions of the Endocrine glands.

Myxoedema, Cretinism, Hypothyroidism in use of thyroid extract and iodine—Hyperthyroidism—Diabetes Mellitus.

Knowledge of insulin therapy and sugar estimation tests.

The education of the patient and relatives with reference to care of the extermities—Insulin dosage and use of glucose—diet and urine test for sugar.

Diseases of pituitary—Diabetes insipidus—Tumours of the pituitary gland—Gigantism and acromegaly.

Surgical and medical treatment and nursing care.

Diseases of the spleen—Nursing care after operation for splenectomy.

Para thyroid deficiency and Tetany. Pancreatitis.

Nursing in conditions of the nervous system.

Brain—Tumours—operative treatment and special nursing care.

Concussion—Fractures of base of skull—Apoplexy—Epilepsy—Hemiplegia—Paraplegia—Special reference to positions of patient—prevention of bedsores—dropfoot—treatment of urinary complications.

Spinal cord and nerves—Tabes dorsalis—disseminated sclerosis—neurites—sciatica—paralysis agitais.

Acute transverse myelitis.

Operation on the spinal cord and special nursing care.

Trigeminal neuralgia—Migraine.

Nursing in conditions of Eye, Ear and Nose.

Eyes.—

Care of the eyes, with reference to hygiene and diet.

General nursing care of eye conditions—Trauma—foreign bodies and use of magnet.

Cataract—Glaucoma—Iridectomy—detached retina—corneal ulcers—Keratitis—Pannophthalanitis—Enucleation of globe.

Conjunctivitis—Bupharitis—lachrymal obstruction—trachoma.

Operation technique for eye surgery.

Effect of Vitamin 'A' deficiency on the eye.

Ear.—

Care of the ears and dangers of syringing. Examination of ears.

Middle ear disease—Myingotomy—Mastoiditis, acute and chronic.

Antrectomy and radical operation for same.

Labyrinthine disease—complications of mastoiditis—Lateral sinus-infection—Deafness—Degeneration of the auditory nerve.

Nose.—

Fracture of nasal bones—plastic operations—deflected septum-Turbinectomy—Adenoids—Polypoid growths.

Pre-operative and post-operative care.

Deficiency diseases.

Prevalence in India—recognition of early symptoms—Beri-beri—Osteomalacia—Rickets—Scurvy—Peripheral Neuritis—Anaemia—Nursing care with special reference to diets.

The prevention of deficiency diseases in its public health aspect.

Allergic conditions.

Asthma—Urticaria—Hay fever—eczema—dermatitis.

Nursing care and the elimination of the allergic factor.

Tropical diseases—Knowledge of causative agents—treatment and nursing care in the following diseases—malaria—Relapsing fever—Plague—Cholera—dysentery—hydrophobia—ankylostomiasis—Kala-azar—leprosy—heat stroke—Filaria—Methods of prevention in the above diseases.

Communicable diseases—Nursing treatment and care of the following diseases with special reference and stress on the prevention of spread of disease—Measles—chickenpox—mumps—smallpox—Tuberculosis—Cerebro spinal meningitis—scarlet fever—encephelitis—diphtheria—syphilis—Gonorrhoea—Acute anterior Poliomyelitis, etc.

Diseases of the Liver and Gall bladder.

Jaundice—Catarrhal—infective and obstructive—Hepatitis—hepatic abscess—Carcinoma.

Biliary colic—formation of gallstones.

Nursing care in the above—with special reference to diet.

Clinical Pathology.

Note:—This section is recommended to be taught in the second term of the second year.

1. Definition of clinical pathology.
2. Study of the normal gastric contents. Variations in common diseases.
3. Study of the normal duodenal contents. Variations in common diseases.
4. Composition of normal urine. Variations in common diseases.
5. Study of gross and microscopic appearances of normal and of abnormal faeces—note parasitic worms and common diseases only.
6. Study of normal blood and of blood from anaemic patients with reference to main features of difference.
7. Composition of cerebrospinal fluid in normal and in meningitis.
8. Composition of body fluids; pleural exudate, ascitic fluid.

Practical work:

1. Demonstration of gastric analysis.
2. Individual class work on urine analysis and on the concentration test.
3. Individual class work on gross examination of faeces, normal and abnormal.
4. Demonstration of parasitic worms and their ova.
5. Examination of blood for haemoglobin by each class member.
6. Demonstration on wards of a lumbar puncture showing normal and on a second case, abnormal, cerebrospinal fluid.
7. Demonstration on wards of characters of (*a*) pleural exudate and (*b*) of ascitic fluid.
8. Demonstration of blood grouping.
9. Demonstration of test for serum sensitivity.

Reference.—"Microbiology and Pathology for Nurses" by Morse, Frobisher, Rabin. Publishers—W. B. Saunders Company, Philadelphia, 1st Edition, August 1942.

(9) NUTRITION

A study of the principles of normal nutrition and the principles and procedures in the care and preparation of foods; the requirements of an adequate diet for normal individuals.

Introduction.—Definition of nutrition; brief historical review of the development of the science of nutrition; the relation of nutrition to normal physical development and maintenance of sound health; food habits; diet in relation to racial stature and longevity; present-day methods of disseminating food facts; place, aim and general content of nutrition courses in the nursing curriculum.

Energy Metabolism.—First essential of an adequate diet; how the energy value of the diet affects growth and development; Metabolism; definition; basal energy metabolism, factors which influence it; unit of measure, the calorie; total energy requirement, factors which influence it. Standards for infants, children, adolescents, adults during pregnancy and lactation. How the energy requirements are met. Foods rich in energy value. Carbohydrates; fats; composition and structure, nutritional value, digestibility, comparative costs.

Protein Metabolism.—Second essential of an adequate diet; adequate protein in quality and quantity to support growth and maintenance. Function of protein as body builder and promoter of growth; composition and structure; sources; requirements; methods of determining requirements; factors governing requirements. Standards for all groups. Effects of high and low protein intake. Foods high in protein content; nutritional value of different proteins; comparative cost; care of protein food products. Underlying principles of protein cookery.

Mineral Metabolism.—Third essential of an adequate diet; sufficient amount of mineral elements for normal metabolism. General function of mineral elements; the more important mineral elements—calcium, phosphorus, iron, iodine, copper, sodium, chlorine, manganese, potassium; sources; metabolism, functions. Standards for all groups. Foods rich in mineral content. Factors limiting utilization.

Vitamins.—Fourth essential of an adequate diet; adequate vitamin content to protect and maintain health. The importance of vitamins in regulating metabolism and controlling the processes involved in growth, maintenance, and reproduction. Experimental evidence. Historical review; isolation and measurement; functions; effects upon reproduction, lactation, growth and longevity; Vitamin A, B-complex, C, D, E, K, specific effects; sources and comparative costs; concentrates and comparative costs; requirements for all groups.

Water and Cellulose—Fifth essential of an adequate diet—provision of water and residue for regulatory purposes; importance in prevention of diseases and in promotion of optimum health. *Water Metabolism*: Functions; sources; requirements of various ages and conditions; water balance, hazards of an inadequate supply or retention of water; foods with a high water content. *Residue*: Cellulose, composition and digestibility, functions, food sources—foods with high cellulose content, factors which affect requirement.

Food Selection, Meal Planning, and Preparation for Individuals and Groups.—The sixth principle—digestibility, palatability and satiety; summary of five essentials of an adequate diet; general discussion of factors which influence digestibility, palatability and satiety. Effect of cooking and food preparation on nutritive value of foods. Balanced Diets for the family group; factors which influence food selection, family income level; composition of family group; occupation of adults; racial habits; religious practices. Factors to

consider in menu planning—adequacy and cost of food in relation to family budget, aesthetic and psychological aspects, available equipment in the home. Factors to consider in food service.

DIET THERAPY.

A continuation of the study of Nutrition, with special attention to diet as a means of treatment of diseases. (It is expected that the instructor will work out the specific diets, under the following headings, keeping in mind Indian foods and diets.)

Diet Therapy in relation to Nursing in conditions of the body as a whole:

Introduction to diet therapy from historical standpoint; essentials of adequate diet as basis for all therapeutic diets; dangers of diet fads; general objectives of dietary treatment in disease; standard hospital diets; reason for choice of foods.

Diet Therapy in relation to Nursing in conditions of the Respiratory System:

Modification of diet in pneumonia and other fevers of short duration: to prevent dehydration—fluids increased; to spare patient unnecessary exertion—easily digested forms; to maintain a normal ketogenic/antiketogenic ratio—carbohydrates are increased.

Modification of normal diet in tuberculosis and other fevers of long duration.

Diet Therapy in relation to Nursing in conditions of the Gastro-Intestinal System:

Modification of the normal diet in diseases of the stomach; and duodenum.

Modification of the normal diet in diseases of the intestines.

Modification of the normal diet in diseases of the hepatic and cholecystic diseases.

Diet Therapy in relation to Nursing in conditions of the Skin and in Allergic conditions:

Modification of the normal diet in skin conditions.

Modification of the normal diet in allergic conditions.

Diet Therapy in relation to Nursing in conditions of the Endocrine Glands and Metabolism:

Modification of the normal diet in diabetes. Varied methods.

Modification of the normal diet in hyperinsulinism.

Modification of the normal diet in hyperthyroidism.

Modification on obesity; in underweight in Addison's disease.

Diet Therapy in relation to Nursing in conditions of the Circulatory System, Blood and Blood-forming Organs:

Modification of the normal diet in cardiac diseases: in anaemia; simple macrocytic, and pernicious anaemia; in hypertension.

Diet Therapy in relation to Nursing in conditions of the Urinary and Genito-Urinary System:

Modification of the normal diet in nephritis; in nephrosis; in phosphoruria; in tuberculosis of the kidney and some types of stone formation; in pyelitis and bacilluria.

Diet Therapy in relation to Nursing in conditions of the Nervous System:

Modification of normal diet in epilepsy; in migraine.

Diet Therapy in relation to Nursing in Deficiency Diseases:

Modification of the normal diet in xerophthalmia, beri-beri, poly-neuritis, scurvy, rickets, osteomalacia, pellagra, tetany, simple goitre, nutritional anaemia.

Diet Therapy in relation to Nursing in conditions of the Musculo-Skeletal System.

Modification of the normal diet in chronic infectious arthritis, in cases complicated by underweight; in static arthritis; in gouty arthritis.

Practice.

(10) HISTORY OF NURSING.

24 Hour Course in 6 Units.

Unit I.

Introduction to Nursing History including the pre-Christian period and earliest developments in India.

1. Introduction: Nursing as a vocation or profession; its relation to other fields of human experience; its relation to the medical profession as well as to other groups co-operating in the care of the sick and maintenance of health; the relation of nursing to other cultural interests; Nursing History as a part of general

history and the effect of political, economic, social and religious conditions on the development of nursing; its close relationship to the education of women, freedom of women, etc.; Sources of material for Nursing History and methods of study.

2. Nursing in the primitive family and various social groups: Origin and roots of the nursing impulse; primitive and mutual aid in early family and social groups; medical practitioners: nursing in the family; origin of hospital in ancient custom of hospitality; superstition in relation to the care of the sick, aged, and helpless; evidences of early practices in Indian villages.

3. Nursing and health work in pre-Christian civilizations; Outstanding contributions of ancient civilizations including Indian, Egyptian, Grecian, and Roman; Development of ethical ideals in relation to charity, medical and nursing services, in the Ten Commandments, Hippocratic oath, and the Vedas.

Unit II.

Nursing as developed in the early Christian period including the mediaeval religious orders and military nursing orders.

1. Nursing in the early Christian era. The general state of the world at the time of the birth of Christ; the effect on the care of the sick of the new religion; organized groups of deacons and deaconesses, and widows; Roman matrons, Paula, Fabiola, Marcella; the ideal of asceticism; rise of Monasticism; development of nursing in monasteries; hospitals as an outgrowth of monasteries; and the nursing and medical care in such hospitals.

2. Aristocratic and military influences: Feudalism with its outgrowth, chivalary *versus* the sheltered, contemplative life of the cloister; combination of chivalric and monastic ideals in the military nursing orders of the crusades; hospital expansion under knightly orders; Hospitallers of St. John as forerunners of the St. John's Ambulance Association of to-day; Distinctive contribution to nursing and to later Red Cross work of the romantic and knightly ideal.

3. Democratic and secular tendencies in mediaeval nursing: Changes in social and economic conditions following the crusades; St. Francis of Assissi, a new type of religious and social leader; his work with lepers; St. Elizabeth and St. Catherine as types of nursing saints of this period.

Unit III.

Changes in Nursing and Hospital work from the 15th to the 19th century and early development of Hospitals in India.

1. Transition from mediaeval to modern era and resulting revolutionary changes. Changing conditions of political, economic, social, and religious life; influence of Renaissance on hospitals, medicine, and nursing; influence of protestant revolt and disestablishment of monasteries; extension of servant nurse system in civic and religious hospitals; deterioration in nursing and hospital work; new methods of scientific inquiry and discovery: improvements in medical science as the result of the work of such leaders as Bacon, Vesalius, Paracelsus, Harvey, Pare, and Sydenham.

2. Pre-Nightingale reformers in nursing and hospital work; Beginnings of modern humanitarian and democratic movements; reforms in nursing and charitable work introduced by St. Vincent de Paul, Mlle. le Gras, and Sisters of Charity; contribution of John Howard, Elizabeth Fry, Charles Dickens, and other humanitarian leaders; revival of deaconesses at Kaiserswerth by the Fleidners, pre-Nightingale efforts in England to establish new types of nursing service; influence of medical and sanitary reforms under Chadwick, Semmelwesis, Holmes, etc.; influence of new political, and social ideals and development of women's movement; development of Government hospitals in Madras and Bombay, etc.; military hospitals; conditions in India at the time of their development.

Unit IV.

The Founding of Modern Nursing and its spreading to other countries.

1. Florence Nightingale and her work; background of her times; her family and social heritage; her education and religious ideals; experience and training as a nurse; the Crimean war; her contribution to reforms in military medical service and civil hospitals; the founding of a nursing school at St. Thomas' Hospital; main features of the new system often much modified; influence on ethical standards and on nursing principles and practice. Miss Nightingale's interest in India and her efforts to improve military hospitals and village sanitation; other contributions of Miss Nightingale, writings, sanitation, etc.

2. Contemporary movements (1850 to 1900): New developments in medicine, surgery, and sanitary science as a result of the discoveries of Pasteur, Lister, Koch, etc.; reforms in public institutions such as workhouses and children's homes; founding of International Red Cross; relationship of nursing and hospital reforms to these movements; development of government and mission hospitals and nursing in India during this period.

3. (Briefly) Survey of international nursing movements: effect of different cultural conditions and stages of development on nursing in different countries; influence of historical and educational backgrounds on the modern situation; how modern nursing came to different parts of the world; relation to other movements, religious, cultural, military, public health, etc.; expansion of nursing service; movement for professional self-development; influence of international contacts and organizations; contribution of different countries to contemporary nursing movements; some outstanding nursing leaders and professional publications.

Unit V.

Nursing in India.

Conditions in India which have affected the development of nursing; development of education for women; certain ideals, ethics, and spiritual life essential for nursing; Nightingale ideals carried to India; development of hospitals and their nursing services including mission hospitals; methods of training and education of nurses; state registration; national nursing organizations; military nursing organizations; nursing publications; establishment of post-graduate courses for nurses; maternity and child welfare work; Florence Nightingale Foundation Scholarship for nurses: Indian Red Cross Association and its assistance to hospitals and nursing; health visitors courses; influence of present war conditions on nursing; changing attitudes towards and concepts of nursing; new emphasis on health nursing, nursing of the mind, nursing of the family and community, the nurse as teacher, etc.

Unit VI.

The Professional Heritage of the Nurse of To-day and her Responsibility for the Progress of Contemporary Nursing History.

1. (Briefly) Development of nursing as a profession; beginnings in mothercraft and mutual aid; nursing as a voluntary, neighbourly

or patriotic service, a phase of religious service, a domestic handicraft, a secular vocation, and organized, independent, and self-governing profession; professional as distinguished from non-professional nursing; widening fields of service and extension of professional responsibilities; inter-relationships of nursing with other professional groups in medicine, social work, dietetics, education, etc.

2. Development of the science and art of nursing; gradual substitution of scientific principles for superstition and magic; progressive changes to be expected from advance in scientific knowledge and better application of science in nursing practice; development of nursing from a simple handicraft to a fine art; importance of creative intelligence and scientific investigation in the further development of the science and art of nursing.

3. Development of professional ideals and standards; beginnings in customs of family and other social groups; how influenced by different religious beliefs and practices, social customs, etc.; contributions to nursing ideals and traditions of monastic, medical, military, charitable and other groups; contribution of outstanding personalities of different periods in developing the spirit and ideals of nursing; modern trends in shaping and expressing nursing standards and ideals; increasing emphasis on individual self-discipline and responsible government by the professional group.

4. The future of nursing; opportunities for improving and extending the service of nurses; for developing a real education in nursing for nurses; for recognizing the need and preparing to care for India's millions of people even in the remote villages with a health and sick nursing service as rapidly as economic conditions, medical and sanitary groups, etc., are able to open the way; responsibility of each generation of nurses for preserving the best of the nursing heritage and adding to it; also for re-interpreting and re-adapting nursing principles, practices, and ideals to meet new social conditions and needs as they develop.

(11) MATERIA MEDICA, PHARMACOLOGY AND THERAPEUTICS.

A nurse is not expected to prescribe. This is the privilege of a qualified doctor. As a nurse has to administer drugs in the treatment

of cases, a general knowledge of drugs and substances which act as drugs in their relationship to the treatment of diseases is essential. The fundamental requirements can be gathered if the student nurse is acquainted with the source from which they are obtained, their physiological actions and their final forms and appearances as prepared in the Pharmacy, by definite standard formulae for administration. The following syllabus may be taken as a guide:—

General Principles:—Scope of pharmacology; mechanism of drug action; absorption; distribution and excretion of drugs; factors modifying drug action; chemical classification of drugs; pharmaceutical preparations. Posology. Reading of prescriptions.

I. *Drugs acting on the Central Nervous System*:—General anaesthetics with special reference to chloroform, ether, nitrous-oxide, ethylene, bromethol.

Hypnotics, with special reference to chloral hydrate, barbiturates. Narcotic poisoning and its treatment. Opium and its derivatives.

Central stimulants with special reference to strychnine, picrotoxin, leptazal, nikethamide, Xanthines.

Drugs acting on Autonomic Effector cells: Acetyl choline and derivatives, eserine, atropine, adrenaline, ephedrine.

Local anaesthetics: Cocaine, procaine, amylocaine, nupercaine.

II. *Action of Digitalis in Cardiac Disease*: *Nitrites*:—Solutions used in the treatment of shock: blood transfusions, plasma, colloid and crystalloid solutions. Haematinics.

III. *Diuretics* with special reference to Xanthines and mercury, alkaline and acidifying salts.

IV. *Ecbolics*:—Ergot, pituitary extract: sex hormones.

V. *Use of Expectorants*:—Oxygen and carbondioxide therapy.

VI. *Pharmacology of the Alimentary Canal*:—Emetics, bitters, antacids, purgatives, intestinal astringents.

Anthelmintics with special reference to Filix mas, thymol, carbon tetrachloride, oil of chenapodium, santonin, diphenan.

VII. *Antiseptics and Disinfectants*:—Oxidising agents, halogens, boric acid, phenol, cresol, chloroxylenol, dye products, metallic antiseptics.

Skin irritants, counter-irritation.

VIII. *Antipyretics*:—Phenacetin, phenazone, amidopyrin, salicylates.

IX. *Metabolic Drugs*:—Thyroid, Insulin.

X. *Chemotherapy* of (i) Malaria: Cinchona, pamaquin, Mepacrine.
(ii) Bacterial infections: sulphonamides, penicillin.
(iii) Syphilis: Arsphenamines, Bismuth, Mercury.

XI. *Vitamins* in therapeutics.

XII. Action and uses of sera and vaccines.

(12) HYGIENE AND PREVENTIVE MEDICINE.

(*Note*:—An elementary knowledge of the basic principles is alone expected.)

PART I—(II Year, Third Term, 36 hours).

General:

The growth and development of the Science of Preventive Medicine; Modern trends in the Health protection of the individual and the community; Social Medicine—The development of a preventive bias in medical and nursing practice. The ideal Health organisation; the Health organisation in Madras Province; Health Surveys.

Nutrition and Health:

Signs of malnutrition; dietary surveys; Food poisoning; Food Inspection; Sanitary control of preparation and sale of Foods; Meat and Milk sanitation; Restaurants, Bakeries.

Maternity and Child Welfare:

Maternal and Infant Mortality; Antenatal care; Midwifery services —Postnatal care—Domiciliary midwifery—Health Visiting—Infant and Child care—A complete Maternity and Child Welfare Organisation.

School Hygiene:

Sanitary requirements of School Buildings and equipment; Medical inspection of School children; School clinics; a Modern School Health programme.

Personal Hygiene:

Influence of heredity and Eugenics on Health; Mental Hygiene; Development of healthy habits; personal cleanliness; clothing;

bathing; care of teeth; physiological aspects of exercise, fatigue and rest.

Industrial Hygiene:

A very brief consideration of the Health hazards in Industries and occupations and their prevention; The Industrial Welfare Nurse and her duties.

The role of insects in disease transmission:

Life-cycle and control of insect pests; Insecticides; Fumigation; the housefly; mosquito; fleas; bugs; lice; ticks; mites.

Communicable Diseases:

General: Sources and channels of infection—Bacteria; Viruses; Protozoa and worms; The Carrier problem; General methods of control of communicable diseases; Notification, Isolation, Quarantine, Immunisation; Disinfection; General principles of Epidemiology; Incubation and Infective periods. An elementary knowledge of the recognition, mode of spread and control of the following communicable diseases:—

Malaria, Filariasis, Yellow Fever.
Kala azar.
Relapsing Fever and Typhus Fever.
Plague.
Cholera; Enteric Fever; Dysentery.
Small-pox; Chicken-pox; Measles.
Mumps; Whooping Cough.
Influenza; Diphtheria; Cerebrospinal Fever.
Tuberculosis; Leprosy.
Venereal diseases.
Rabies; Anthrax.
Scabies.
Round worm; hookworm; guinea worm; tapeworms.

PART II—(III Year, First Term, 24 hours.)

Sanitation of the environment:

Dangers to health arising from insanitary surroundings; Sanitary methods of collection and disposal of Refuse and Nightsoil in Villages and Towns; Compost: Trenching; Sanitary types of privies; borehole latrine; The Water Carriage System—Methods of disposal of Sewage and Waste Waters; Disposal of the dead.

Village Sanitation; Sanitation of Fairs and Festivals; Hospital Sanitation.

Water Supply and Health:

Sources; impurities; pollution; Water-borne diseases; protected water supply schemes for Rural areas and Towns; wells; Tube wells; bore wells; Water purification—domestic and large scale methods; Water softening; Filtration; Chlorination.

Air and Ventilation:

Composition of outdoor and indoor Air; Vitiation of air, causes of discomfort in crowded rooms; Kata thermometer; Methods of Ventilation; requirements of Floor and cubic space; Air conditioning.

Buildings—Sanitary construction; prevention of dampness.

Vital Statistics:

Registration of Births and Deaths and the need therefor. Populations; Census; Birth and Death Rates; Case Fatality Rate; Infant and Maternal Mortality Rates; the usefulness of these data as a measure of Health conditions.

Health Legislation:

Obligations under the Public Health Acts.

Note:—The lectures will be illustrated by visits to places and institutions of Public Health interest.

(13) GYNAECOLOGICAL AND OBSTETRICAL NURSING

(60 Hours).

A. GYNAECOLOGICAL NURSING (35 Hours).

Unit I. *Review of the Anatomy and physiology of the female reproductive organs*:

Structure, blood and nerve supply, etc. Physiology.

" II. *Mental and social significance in Gynaecological conditions and diseases*:

Psychological approach to the patient. Hygiene of puberty, adolescence and menopause.

Personal and Public Health aspects.

Unit III. ***Examinations and diagnostic Measures.***

Nurses' special responsibilities in assisting the doctor and the patient. Positions and draping. Instruments and appliances necessary.

" IV. ***Gynaecological disorders and diseases:***

Abnormalities of Menstrual cycle; dysmenorrhea, amenorrhea, etc. Displacements and relaxations; prolapses, cystoceles, etc.

Inflammations and infections; vulvitis, vaginitis, salpingitis, etc. Growths; benign and malignant.

Congenital abnormalities; absence of uterus and adnexa, infantile genitalia, atresia of vagina, etc.

Abortion, ectopic gestation, artificial and premature menopause.

Nursing care of:

" V. *Therapeutic measures:*

Treatment, operations, medications and diets.

Pre-operative, operative and post-operative care.

B. OBSTETRICAL NURSING (25 Hours)

Unit I. ***Reproduction:***

Anatomy and physiology of reproduction. Development of embryo, Sex education. Birth control and spacing. Costs and reducing costs of reproduction. Morbidity and infant and maternal mortality.

" II. ***Nursing in pregnancy:***

Normal pregnancy, signs, etc. Complicated pregnancy. Antenatal care, medical and nursing.

" III. *Nurses' responsibilities and duties during puerperium:*

Normal puerperium, physical and mental adjustments of the patient.

Involution, lactation, etc.

Complicated puerperium, causes, symptoms, prevention and treatment for all abnormal conditions.

Unit IV. *Care of the Newborn*:

Adjustments to the environment. Nursing care of normal infant.

Feeding, breast and artifical.

Symptoms of complications and diseases and nursing care in:

Instructions to the mother.

(14) WORLD HISTORY.

One year Syllabus on World History.—The Syllabus is divided into three parts, corresponding to the three terms of the year. Each part is divided into ten weeks in order roughly to indicate the relative amount of detail required for the subjects mentioned. The allocation of the material under a scheme of two lectures a week is indicated by (a) and (b).

PART I.

1 (*a*) *World Geography.*—General features from the standpoint of human geography. Areas inhabited by pre-historic man.

(*b*) *Pre-historic Man.*—Tools. Language. Art. Cultivation. Religion. Wanderings.

2. *Chief Features of Ancient Civilisations*—(*a*) Mesopotamia. Indus Valley. Egypt. (*b*) Aegean. China.

3 (*a*) *Great Empires of the Ancient World and their rivalries.*—Egypt. Assyria. Persia. (*b*) *China* up to the collapse of the Han Empire.

4 (*a*) *India* up to the end of the Gupta Period. (*b*) *Greece* : i. City-States. Democracy. Persian Wars. Pericles.

5. *Greece* (contd.) (*a*) ii. Peloponnesian War. Alexander.
(*b*) iii. Greek way of life.

6. *The Roman Empire.*—(*a*) City-State to Empire. Organization, political and economic (*b*) Christianity and the Christian Church.

7. *Mediaeval Christendom.*—(*a*) i. Break-up of the Roman Empire. The Church. Feudalism. Charlemagne. The Holy Roman Empire. (*b*) ii. The Mediaeval Church: Position of the Pope. Other aspects of the Church.

8 (*a*) *Mediaeval Christendom* (contd). iii. Political characteristics of Mediaeval Europe. Feudal Monarchies; Magna Charta; Corporations; Representative Institutions. (*b*) *The Contemporary Asiatic World.* i. Islam.

9 (*a*) *The Contemporary Asiatic World* (contd.). ii. The Mongols. The Moghuls. The Ottoman Turks. Advance of the Turks into Europe.

(*b*) *Life of the Common People.*—Comparison on broad lines between Mediaeval Europe, Islamic World, India, China.

10. *The New age in Europe.*—(*a*) Renaissance. (*b*) Reformation.

PART II.

1 (*a*) *Nation-States*; *Dynastic power politics.*—The New Monarchy: Spain; France; England. Dynastic Power-Politics: Hapsburgs; Richelieu (*b*) *Types of Monarchy*: King and Parliament; Louis XIV; Frederick II.

2 (*a*) *Central and Eastern Europe.*—Russia. Poland (Partitions). Danube Basin.

(*b*) *European Expansion overseas*: i. Voyages. Trade Settlement.

3 (*a*) *European Expansion overseas* (contd.). ii. Conquest. Rivalries. Map of the World 1763. (*b*) *Revolution*: American War of Independence. American Democracy. French Revolution: Causes.

4 (*a*) *French Revolution* (contd.) Course. *Napoleon*: Scope of conquests; principles of Government; reasons for failure.

(*b*) *The 19th Century.*—The settlement of 1815. Nationalism and Liberalism in the first half of the 19th Century.

5 (*a*) *The 19th Century* (contd.). Italy. Smaller nations as types of Democracy.

(*b*) *19th Century Industrialism in Europe and America.*—Industrial Revolution. Banking. Condition of the workers. Trades Unions.

6 (*a*) *Industrialism* (contd.) The Women's Movement. Humanitarianism. Developments in Europe and America parallelled by later developments in India.

(*b*) *U.S.A.* i. Expansion. Relation to her neighbours. Civil war.

7 (*a*) *U.S.A.* (contd.) ii. Middle West and West. Big Business. Monroe Doctrine. Ideal of Liberty. Immigration.

(*b*) *Capitalist Power-Politics.*—Creation of modern Germany by Bismaik. Austria-Hungary and S. E. Europe.

8 (*a*) *Rival European Interests.*—The Mediterranean and N. Africa; the partition of Africa; the Far East and the Pacific; German ascendancy in Europe; German hopes; British Empire: Extent; Types of Government; British Sea Power.

(*b*) *The New Age of Industrialism and Nationalism in the East.*—Japan. China.

9. *The New Age in the East.* (contd.) Modern India. (*a*) Economic, Social. (*b*) Political.

10. *The War of 1914-18.* (a) Causes, Brief review of course. (b) World Survey 1918.

PART III.

1. *Post-War Settlement 1918-24.*—(a) Summary of treaties. Political Geography of the world. (b) World communications. World economic Geography. World Strategic Geography (Naval and Air Bases).

2. *General results of the War of 1914-18.*—(*a*) Advance in Technical power and medical Science. Psychological condition of combatant countries. (*b*) "Self-determination". Minority problems. Social problems and experiments. Party uniforms. League of Nations: structure and aims.

3 (*a*) *Russia,* 1917-1939.—Revolution. Lenin. The Communist State. Planning. Stalin. (*b*) *Other one-party States and Dictatorships.*—Conditions which produce dictators. Chief characteristics of dictatorship. Mussolini.

4 (*a*) *Dictatorships* (contd.). Hitler. Kemal. Franco. Other Dictators.

(*b*) *The Democracies,* 1918-1935.—Interior conditions: England; The Dominions; France.

5 (*a*) *The Democracies* (contd.). U.S.A.; Czecho-Slovakia: other small nations. The Democracies and the Dictators: international relations.

(*b*) *The Axis.*—Italy—Germany—Spain—Japan. Spheres of action: Abyssinia; Mediterranean; Spain; Manchuria; China; S. America.

6 (*a*) *The Axis* (contd.) "Greater Germany": Hitler's Aims; Austria; Czecho-Slovakia; Poland; Germany's attitude to France; Great Britain; Russia.

(*b*) *The War 1939.*—Causes. Issues at stake. Attitude of Russia and America in 1939. Position of India.

7. *The War* (contd.) (*a*) German triumph 1939–1942. Britain. Russia. (*b*) General strategy of the War: Air-power; sea power; economic power. Eastern Mediterranean and Middle East. Japan and China.

8. *The War* (contd.) (*a*) Japan and the Pacific. Situation of India. U.S.A. and the War. (*b*) The turn of the tide. Course of the War 1942—45.

9 (*a*) *India since 1939.*—Strategic position. Political deadlock. Economic changes.

(*b*) *Factors in the future world situation.*—Technical developments. Population problems (Refugee problem; minorities). Rehabilitation of shattered countries.

10. *Outlook for world co-operation.*—(*a*) Historical retrospect. Various forms of unity. Development of world communications. World economics. The League of Nations: its achievements (Political, economic, social; the I.L.O.); reasons for its failure (*b*) New Hopes and Fears; Present day unions; alliances; examples of international co-operation (*e.g.*, U.N.R.R.A.) and plans for the future. India's angle of approach to world problems.

Suggestions for Books.

In each case the latest edition should be used.

Note: A single asterisk* against a book indicates that it is recommended for students, and a double asterisk** indicates that it is specially recommended both for teachers and students.

** R. Flenley & W. N. Weech:	World History. The Growth of Western Civilization. (Dent, 1936.)
* H. A. Davis:	An Outline History of the World. (O.U.P. 1939.)
* F. G. Pearce:	Footprints on the Sands of Time. (O.U.P. 1943.)
Rhoda Power:	Great People of the Past. (C.U.P. 1932.)
Hutton Webster:	World History. (D.C. Heath & Co. 1925.)

H. G. Wells:	A Short History of the World. (Cassell, 1922.)	
F. S. Marin:	The Living Past. (Clarendon Press, 1913)	
Breasted:	Ancient Times. (Ginn & Co., 1920.)	
M. Deanesley:	A History of the Mediaeval Church (Methuen.)	
Oxford Pamphlets on World Affairs.		O.U.P.
Stembridge:	The World Geography.	O.U.P. 1939
* Ramsay Muir & George Philip	Philip's New School Atlas of Universal History.	Philip's & London Geographical Institute, 1939.
J. F. Horabin	Atlas; European History (2nd—20th Century.)	Gollancz.
......	Atlas of Current Affairs.	Do.

(15) NURSING OF CHILDREN

Unit I

Normal growth and development of the child:

Infant at birth.—Adjustment to new environment from the seclusion and protection in utero to the world of unstable temperature, light, noise and movement. Bathing, clothing of the infant. Importance of establishing regular habits from birth, both from the point of view of physical needs and to give the child a sense of security necessary for stability in later development. Increase of weight.

Stages of development of the infant.—Physical and psychological needs of each stage. (1) Feeding, sleep, warmth, security. (2) The ideal environment. (3) Focussing ability. (4) Movements of limbs. (5) Play instinct. (6) Habit crying, causes and its prevention.

Early childhood.—Development of good habits in sleeping, eating, defectation and micturition. Fostering of good habits retards the development of bad.

Develotment in later childhood.—Physical and psychological needs, Nervousness, its causes and prevention. Methods of employing the child. Stability and instability. Causes of instability and its prevention. Social development and orientation to the family. Other contacts. Adjustment to school.

Early adolescence.—Nervousness. Self-consciousness. Self-display. Physical and mental hygiene during puberty. Process of maturation: review of physical, mental, emotional and social development traced from infancy through adolescence to re-emphasise interdependence of phases of development and the gradual nature of maturation.

Unit II

Nutrition of Infants.—Composition of human milk. Comparison with other milk, cows, goats. Breast feeding, its advantages. Contra indications for breast feeding. Methods of modification of milk. Methods of sterilisation. Addition of carbohydrates, protein, vitamin content. Calculation of amount according to weight and rapidity of growth. Feeding of premature infants. Education of the digestion. Regularity in feeding. Regulation of feeding. Weaning. Dried milks—advantages and disadvantages. Their formulae. Methods of preparing and keeping.

Special nutritional requirements of the growing child.—Mineral salt content. Relative proportion of protein content in the diet to that of adults. Prevention of deficiency diseases.

Unit III

Orientation to the nursing of children and to children's division of hospital.—Adaptation of nursing methods and procedures to children. Hours of sleep, rest, recreation. The reaction of the child on admission to hospital. Methods of securing co-operation of the child for examination and treatment. Securing co-operation of parent. Fretfulness, loss of appetite, sleeplessness. Convulsions, constipation. Importance of acute observation of habits deviating from the normal. Methods of locating pain. Postures assumed by the sick child. The child in convalescence.

Introduction to the children's division.—Admission of the child. Relationship with parents. Care of clothing. Clothing of child. Reasons for separate division; adaptations and additions essential for a suitable environment. Types of cots. Pictures, books, toys. Children's dining room. Individual bed unit. Facilities used in common ; provisions for isolation and safety.

Unit IV

Nursing in diseases of infancy and childhood. General characteristics of child compared with adults. Defence against disease.

Differences in manifestation of disease. Effect upon physical and mental development. Provision for education in chronic diseases during school period.

Abnormal conditions and diseases of the new born.—Icterus Neonatorum, Icterus Neonatorum Gravis, Pemphigus, Facial Paralysis, Erbs Paralysis, Tetanus, Melena Neonatorum, Congenital Syphilis, Thrush, Exomphalos, Anaemia of the new born, Spina Bifida. Hare lip and cleft palate.

Diseases of the upper and lower respiratory tract.—Adenoids, Tonsillitis, Laryngismus Stridulous, Bronchitis, Bronchopneumonia, Lobar Pneumonia, Pleurisy, Pleural Effusion, Empyema. Tuberculosis, Asthma.

Diseases of Nutrition.—Vomiting, Habit vomiting, Diarrhoea, Scurvey, Rickets, Caeliac disease, Beri-Beri—Anaemia, Night-blindness.

Abnormal conditions and diseases of the gastro-intestinal tract.—Indigestion, Colic, Intestinal parasites, Constipation, Abdominal Tuberculosis, Hernia, Congenital Pyloric Stenosis, medical and surgical treatment of same. Appendicitis, Imperforate anus, Imperforate rectum, Intussusception, Dysentery. Hirschsprung's disease.

Diseases of the heart and circulatory system.—Endocarditis, Pericarditis, Congenital heart disease.

Abnormal conditions and diseases of the blood.—Anaemia, Leukemia. Purpura. Hemophilia.

Diseases of the Genito-Urinary System.—Nephritis, Pyelitis, Vul, vovaginitis, Enuresis. New growths—Hypernephroma.

Diseases of the lymphatic glands.—Adenitis, Tuberculous adenitis, Lymphangitis, Lymphadenoma.

Diseases of the glands of internal secretion.—Diabetes mellitus, Diabetes insipidus. Hyper Thyroidism, Imbecility, Parathyroid deficiency. Tetany.

Communicable diseases.—Measles, chickenpox, smallpox, whooping cough, Rubella, Mumps, Pulmonary Tuberculosis.

Diseases and disturbance of the nervous system.—Mental deficiency, Mongolian imbecility, Convulsions, Epilepsy, Hydrocephalus, Cerebro-spinal meningitis, Anterior Poliomyelitis, Meningitis, T.B. Meningitis, Head nodding and Nystagmus, Chorea.

Disorder of the eye, ear and nose—Foreign bodies, Conjunctivitis Blepharitis, Ophthalmitis, Squint, Errors of Refraction, Corneal Ulcer, Trachoma, Mastoid Infection. Foreign bodies. Middle ear disease.

Diseases and conditions of the skin and hair.—Dermatitis, Impetigo contagiosa, Tinea, etc. Pediculosis, Alopecia, Scabies.

Diseases of the bones and joints—Deformities.—T. B. of Spine, and Joints. Congenital deformities, Torticollis, Talipes:

Equino Varus
Equinus
Calcaneus, Valgus

Congenital dislocation of hip.
Trauma—wounds, contusions.
Fractures, Rheumatism, Arthritis.

Allergic conditions.

New growths.—Sarcoma.

(16) PUBLIC HEALTH NURSING.

The Public Health Nursing Movement:

Earliest developments in the home and community. Beginning of the modern Movement in England, spread to America, development in the United States of America, later developments and spread throughout the world.

Principles, Education and records:

Basic principles of Public Health Nursing. Education for Public Health Nursing, undergraduate and postgraduate.

Records and statistics.

Organization of Public Health Nursing Services in various countries:

Under private agencies, organization, functions of the board, officers and committees of the board of agency.

Under Governmental agencies, organization on provincial and central basis, municipal or village basis.

The situation in India to-day—health visitors and their work.

The Nurse in the Public Health Nursing Service:

Personal, educationl and professional qualifications for successful public health nurse. The public health nurse working alone in a rural community, working on an urban staff with others.

Supervision and administration in public health nursing service.

Staff leadership and education.

Scope of Public Health Nursing Services:

Maternal and Child Health work.

School and Industrial Nursing. Communicable disease nursing in homes.

Health education. Mental hygiene.

Public Health Nursing Services in India:

Creating a community consciousness of health needs and the development of a Public Health Nursing service, problems involved, pack nurses, use of voluntary workers. Financial support and type of control, public or private.

(17) ADVANCED NURSING.

Methods: Units I and III—Individual Conferences and Seminars
Unit II—Class lectures and demonstrations.

Unit I. Special types of Experience:

Assigment of student to specific types of experience which have been less well covered and which involve nursing problems of greater difficulty than those previously met with, special procedures and therapeutic measures and special dietary as well as involving special psychological or other factors which complicate the nursing situation.

" *II. First Aid and Nursing in Emergencies:*

Special stress on emergencies outside the hospital environment. The subject matter of St. John Ambulance First Aid Course not previously covered (*e.g.* Anatomy and Physiology fully covered). Emergency Nursing as is necessary in disaster service and as practised in Red Cross emergency nursing service.

" *III. Selected problems such as:*

1. Study of the rural health situation, problems, needs and resources, trends and possible developments.
2. Study and review of reports of Public Health Commissions.
3. Public Health as relating to Vital Statistics.

4. Study of nursing needs of patient with selected type of chronic illness in the home of other selected problems and studies.

5. Slum conditions.

(18) COMMUNITY HEALTH AND SOCIAL NEEDS.

In the Urban and Rural Community and among all classes.

Unit I. The Nurse in the Community:

The family as the social and health unit of the community.

Influence of social customs and conditions on health and disease.

Community resources for prevention of disease, promotion of health and social well-being.

The nurse's approach to the family, appreciation of health work and its possibilities and values.

Means whereby the nurse may assist the family in the care of the sick in the home and in their health needs; teaching the family how to care for the sick, the adjustments of the members of the family, instructions in diets, budget and daily work schedules, reconstruction, training of children, etc. How to get and keep health.

,, II. Social needs and resources of the Community:

Social needs and current social problems which affect health.

Essential conditions that every family may develop normally, establish and maintain itself in health and on a reasonable level of living.

Educational and recreational facilities and the assurance of security in illness and old age.

Community resources to meet the needs, solve the problems and ensure growth, normal development and healthy life.

,, III. Health needs and resources of the Community:

Current health problem. Conditions essential to securing and maintaining health, safeguarding growth and development, protection from infectious diseases. Medical and Nursing care as essential to well-being of the community.

The available resources; Department of Public Health, Red Cross, private agencies, health legislation.

Water, milk and food supplies. Disposal of waste, housing, etc.

Unit IV. Health and Social Legislation in India and other Countries:

Study of legislation already enacted in this sphere.

Effect of social legislation on health, labour laws, provision for aged, widows, mothers, crippled children and adults, blind, etc.

Effect of Health Administration and health education on social progress.

Trends and future development.

(19) WARD TEACHING AND ADMINISTRATION.

Purpose and aim of the Course:

(1) To give an introduction to ward administration and teaching adequate to prepare the young graduate to enter effectively into the programme of the Hospital Nursing Service and the School of Nursing.

(2) To improve the ward teaching and increase the value of the clinical experience student nurses receive.

Unit I. Ward Administration:

Hospital organisation, types of hospitals—the hospital board, its composition and duties. Department organisation with special reference to the Nursing Department. Lines of authority, delegated authority and responsibility.

The work on a ward, nursing service and nursing and medical education, health teaching. Standards for staff equipment, etc. The fundamental principles of administration, the personality and characteristics of a good administrator.

The Functions of the Sister in charge of ward "as a hostess, as a nursing expert, as a practical sanitarian, as a housekeeper and steward, as an economist, as a junior executive, as a teacher of patients and personnel."* Her responsibility for the professional growth and development of all who work with her.

*Wayland "The Hospital Head Nurse."

Unit II. Ward Teaching:

How we learn, readiness, mind-set, effect, exercise, association, forgetting and over-learning.

Planning a ward teaching programme—The interrelation of ward experience, ward teaching and classroom teaching. Aims and objectives of the ward teaching programme, selection of content, teaching aids, the ward library.

Methods of ward teaching, work assignment, conferences, Nursing demonstrations on the wards, ward rounds, nursing clinics, nursing care plans, nursing care studies.

The problem of the individual student evaluation of work, stimulating interest, encouraging initiative, teaching students to set standards for themselves and evaluate their own work.

Some Text and Reference Books advised:

Mac Manus:	"Hospital Administration for Women".
Wayland:	"The Hospital Head Nurse".
Sellew:	"Ward Administration".
Jensen:	"The Principles and Practice of Ward Teaching".
Taylor:	"Ward Teaching Methods of Clinical Instruction".
Harmer:	"Methods and Principles of Teaching the Principles and Practice of Nursing."

(20) PROFESSIONAL OPPORTUNITIES AND ADJUSTMENTS.

Aim and Purpose of the Course:

(1) To help the student understand the professional responsibility she will have as a young graduate nurse, to herself, to her profession and to society.

(2) To help the student get an all-India view of the health and nursing situation and the problems which confront her profession.

(3) To give a bird's eye view of the various fields of nursing open to nurses and the qualifications essential for the main branches.

(4) To study the trends in nursing development and nursing education, both abroad and in India.

Unit I. The nurse and professional organisations:

The Nursing Councils, registration, reciprocity, legislation in nursing. The Trained Nurses' Association of India, the Nursing Auxiliary of the C.M.A. Indian Red Cross. Indian Military Nursing Service, International Council of Nurses.

Unit II.

The responsibility of a Nurse for her own continued professional growth, her reading, the nurse as a writer, choosing a position, applying for a position, resigning from a position. Post-graduate study for the nurse.

Unit III. The Health situation in India to-day:

A consideration of the health problems of the country and attempts that are being made to meet them. Malaria, leprosy, tuberculosis, venereal diseases, maternity and child welfare, School health, industrial health problems. Rural health—economic factors in national health—health education, the method—preventive medicine, the responsibility of the nurse. Problems in the local community, the problems of the villages.

Unit IV. Fields of Nursing:

Hospital nursing, private duty, rural fields, maternity and child welfare, school nursing, industrial nursing; tuberculosis nursing, leprosy nursing, mental nursing, government services. Things to be considered when selecting a field.

Unit V. Trends in Nursing and Nursing education in India and abroad:

Trends towards an emphasis on building health and preventive measures, the development of public health services. Trends towards uniformity of standards. Trends towards considering the needs of all people. Recent developments in health and nursing services, their significance and a summary of present day problems and probable future developments.

Some Text and Reference Books suggested:

Spalding: Professional Adjustments in Nursing II.
Gabriel: Professional Problems.
Hansen: Professional Relationships of the Nurse.
Gardner: Public Health Nursing.
Wales: The Public Health Nurse in Action.

(21) SOCIOLOGY.

(24 Lectures)

Introductory Course: II Year.

In this part of the course attempt is made to acquaint the student with the evolution of society, its basis and structure, the forces operating within it, the nature of social change, and factors and methods of social reconstruction.

1. Enquiry into Indian social conditions and examination of their effects—such conditions as malnutrition, marriage of the immature, ignorance, disease and squalor.

2. Importance of the study of sociology. Sociology as a synthesis of social sciences. Its relation to Anthropology, Biology, History, Economics, Politics and Law.

3. The origin and evolution of society—primitive society, the clan and the tribe. Patriarchal and matriarchal societies. Kinship, adoption, and marriage. Exogamy and endogamy. Caste and race.

4. Society and the individual. The value of individual personality. The democratic basis of the society. Importance of the individual in Hindu, Muslim, and Christian literature. The individual as an isolated unit *vs.* the socialised individual. The individual in the midst of social relationships, together with social rights and responsibilities as the unit of our thought and discussion. Social harmony and social disruption.

5. Social groups and social institutions. Uses and abuses of social groups. The family, caste and communal groups. Economic groups, such as, trade unions. Racial groups. The idea of a world society.

6. The nature of social change and the meaning of social progress. Social change in Hinduism and Islam. Social change in daily life. Social change in the city and village. Factors of social change. Social logs. Culture contacts and fusion. Culture contacts and friction.

7. Principles and methods of social reconstruction. Philosophy of society. Social reconstruction promoted by state action, by public opinion through the press, platform, cinema, and radio, by welfare organisations, educational institutions, the home, and personal example.

8. Social Psychology—The meaning of group mind. The group as an entity. The crowd and society. The meaning of community. Instinct, custom, tradition, and reason in their relation to social progress.

IV. Year (72 lectures.)

In this part of the course, attempt is made to acquaint the student with the causes and the care of the main social problems of our day and the machinery for social improvement.

1. Social survey—Study, investigation, report, recommendations, machinery for the carrying out of recommendations, and check-up. The importance of case study. Some important social studies—Booth and Rowntree. American studies, such as, the Russell Sage Foundation studies. Famine commissions in India.

2. The case for the trained social worker. His equipment. Spheres of social rehabilitation where the trained worker is needed. The nurse and community services. The nurse as the friend of the people in health or sickness; as teacher and social worker; as the protector and promoter of public health.

3. The probelm of poverty and dependency. The nature and extent of poverty in India. Causes of poverty and their removal. Social, economic and political remedies. Overpopulation. The truth and falsity of Malthusian theory. Birth and death rates in India. Comparison with other countries. Malnutrition and changes in national diet.

4. Harmful social customs and their removal. Caste exclusiveness and untouchability. Modification of the rigours of caste by state and social action. Marriage of the immature and marriage practices. Close in-breeding and its consequences. The purdah. Eugenic and hygienic practices. Legal disabilities of women in Hindu and Islamic society. The Hindu Law amendment. Polygamy and polyandry and attempts at their abolition. The law of divorce in India. Limitation of the joint family system. The dowry. Inheritance.

Prostitution—Its incidence in cities. Migration of population, overcrowding, disparity in sexes among the labouring population in cities. Control of veneral diseases. Sex education: birth control. International control of traffic in women and children.

Commercialised recreation. The right use of the cinema, the theatre, and the radio. Group games, sports, revival of Indian dance.

The drink traffic and traffic in drugs. The case for and against prohibition. Temperance, local option. Betting and gambling. Laws relating to all these in India.

5. The housing problem and slum clearance. Town planning. The cultivation of a civic spirit. Regard for public property. The meaning and implications of a home. Family budget and planning.

6. Women's rights. Women at home. Women in employment. Women in public life. Women as social workers and teachers. The Indian ideal of womanhood.

BOOKS.

PART I.

* Thomson: What is Man?
* Marret: Anthropology.
* Park and Burgess: Introduction to the Study of Sociology.
  G. H. Cooley: Human Nature and the Social Order.
  Rivers: Social Organisation.
  Hayes: Sociology.
  Bushes: Principles of Sociology.
  Blackman and Gillin: Outlines of Sociology.
  Ellwood: Social Psychology.
* Jenks: The State and Nation.
* Wallis and Willey: Readings in Sociology—Chapters II, V, VI, VII, VIII, IX, XI, XIV and XVI.
  R. K. Mukerjee and Sen Gupta: Social Psychology.
  D. P. Mukerjee: The Basic Concepts in Sociology.
* Stanley Rice: Hindu Customs and their Origin.
  Jethra Brown: Underlying Principles of Modern Legislation.

PART II.

* Gillin: Poverty and Dependency.
  Ford: Social Problems and Social Policy.
* Elliot and Merrill: Social Disroganisation.
* Simey: Social Administration.
  Senart: Caste in India.
* Appasamy: Legal Aspects of Social Reform.
* Manshardt: Social Legislation in Bombay.
  Visvanathan: Racial Synthesis in Hindu Culture.

Haikernal: Social and Economic Conditions of Crime in India.

Subramania Pillay: Criminology.

Sen: Penology.

* Women's Rights under Hindu Law—Report of Committee appointed by the Maharajah of Mysore.

Mysore Prison Reform Committee Report.

* Madras Public Health Act.

League of Nations Publications on Health, Narcotics, Traffic in Women and Children, etc.

P. E. P. Publications (England).

Margaret Read: The Indian Peasant Uprooted.

R. K. Mukerjee: Feeding India's 400 Millions.

Gyan Chand: Our Teeming Millions.

P. J. Thomas and K. C. Ramakrishnan: Some South Indian Villages—Resurveyed.

Oxford University Pamphlets—(1) J. Natarajan—Social Reform.
(2) The Cultural Problem by several writers.
(3) Mrs. Menon—The Women of India.

Asirvatham—(1) Social Legislation in India in the Golden Jubilee Number of the Madras Law Journal.
(2) Principles of Social Reconstruction—Madras University Journal, January 1945.
(3) Chapters on Caste, Home and Recreation—in "A New Social Order."

The Journal of Social Work (published by the Tata Graduate School of Social Work).

O'Malley: India's Social Heritage.

* Edited by Blunt: Social Services in India.

* Jolly: Hindu Law and Custom.

* Wiser: Behind the Mud Walls.

* Hatch: Up from Poverty.

Heinrich: The Psychology of the Oppressed.

(Books marked with an asterisk* for detailed study).

APPENDIX XVIII.

B.E. DEGREE EXAMINATION.

First and Second B. E. Examinations.

(1) MATHEMATICS I.

Co-ordinate Geometry :—Simple properties of straight line, Circle, Parabola, ellipse and hyperbola (in Cartesian and polar co-ordinates) and easy problems thereon.

Differential Calculus :—Differentiation ; Simple Applications of the Derivative to Geometry and Mechanics ; approximations and small errors ; Theorems of mean value ; Evaluation of indeterminate forms; maxima and minima of functions of one variable.

Statics:—Composition and resolution of forces, moments; couples, conditions of equilibrium of forces in one plane ; friction ; work ; virtual work ; centre of gravity ; stable and unstable equilibrium ; the common catenary ; the parabolic catenary ; light string on a rough curve.

(2) PHYSICS.

Heat :—Temperature measurements; gas thermometer; pyrometers, their construction and uses ; electrical resistance, thermo-electrical, radiation and optical pyrometers. Expansion of solids, liquids and gases and their practical applications. Heat as quantity, and methods of calorimetry. Calorimeters ; Louis Thompson's Bomb, and Boys. Vaporisation: evaporation and ebullition ; effect of pressure on the boiling point. Properties of saturated vapours, critical constants. Conduction of heat ; convection, radiation and the laws of cooling. The nature of heat ; determination of the dynamical equivalent of heat. The laws of thermodynamics. Carnot's cycle. Absolute scale of temperature.

Light :—The propagation of light ; photometry. The laws of reflection and refraction of rays of light ; the sextant: passage of a ray through a prism. The direct reflection and refraction of small pencils at plane and spherical surfaces, passage through a lens. Formation of images. The telescope and microscope. The compound nature of white light ; formation of a pure spectrum ; the achromatic lens. Polarization.

Magnetism and Electricity:—Magnetic poles; lines of force; forces and couples on magnets in the magnetic field. Direction of fields due to current in a straight wire and coils. The effect of introducing an iron core into the magnetic circuit. Induced magnetisation. Magnetic properties of iron and steel; hysteresis. The more common cells; standard cells; current; E.M.F.; Ohm's law. Electrical units; Coloumb; Ampere; Volt; Ohm; Watt; Watt hour. Specific resistances. Measurement of resistances; Wheatstone bridge. Conductors in series and parallel. Drop of potential.

Potential energy of a circuit carrying current placed in a magnetic field and derivation of forces and couples on circuit. Application to moving coil instrument.

Electro-magnetic induction:—Maxwell's law. Dynamos and motors. Induction coil.

Charge:—Potential; capacity of condensers; discharge current; energy charged condensers.

(3) CHEMISTRY.

(*Only an elementary treatment is expected.*)

1. *Technology of water*:—Sources and impurities.

   (*a*) *Drinking water*:—Its source and evaluation from a hygienic point of view—purification—methods of filtration—filters—chemical sterilisation of water.

   (*b*) *Boiler feed water*:—Temporary and permanent hardness—boiler scale, its composition and effect on boiler—water softening and types of softeners—Iron in water and its treatment.

2. *Fuels*:—Solid, liquid and gaseous fuels—proximate and ultimate analysis of coal—evaluation of fuels—calorific value and intensity—chemistry of combustion—determination of the amount of air required for the combustion of fuels. Economic utilisation of fuels—analysis of flue gases and its significance.

3. *Paints and Varnishes*:—Definitions—white pigments—coloured pigments—(blue, green, yellow, red, brown and black) corrosive and anti-corrosive pigments—lake pigments. Varnishing oils—chemistry of drying thinners—varnish resins—shellac—Balsam, Lacquers and enamels.

4. *Building materials*:—Lime—clay—sand-kilns and the reactions in them—gypsum—hydraulic lime—cement (natural and

portland). Chemistry of cement manufacture and its analysis. The phenomena of setting and hardening and the factors that influence them. Porcelain. Refractories. Adhesives.

5. *Metallurgy*:—A general treatment of non-ferrous metals and their alloys. Iron and steel—corrosion and its prevention. Electricity in metallurgical operations.

6. Elementary treatment of the theory of electrolytic dissociation and its application to electro-plating.

7. *Abrasives and polishes.*

8. *Lubricants.*

9. *Rubber and insulating materials.*

(4) APPLIED MECHANICS I.*

Statics:—Coplanar forces—Parallelogram, triangle and polygon of forces—graphical methods.

Statically determinate forces:—Calculation and graphical determination of forces in members of simple roof-trusses and braced girders; cranes, etc.

Principle of work:—Simple machines.

Properties of sections:—Calculation and graphical determination of areas, positions of centroid, neutral axis, moments of inertia, modulus of section and radii of gyration with special reference to structural shapes.

Simple stresses and strains:—Compressive, tensile, shearing, and bearing stresses, Hooke's law, stress-strain and load-extension curves; dead, live and shock loads: factors of safety and working stresses; work and resilience; elastic moduli, Poisson's ratio and relation between elastic constants; temperature stresses; composite bars.

Riveted Joints:—Resistance of a rivet or bolt in single or double shear and in bearing, and the working strength of a rivet or bolt, strength of lap and butt joints; efficiency of joints.

(5) CIVIL ENGINEERING I.

BUILDING MATERIALS.

(*a*) *Stones, Bricks and Tiles*:—Different varieties, their characteristics: tests and uses; methods of quarrying and blasting rock and

*The question paper shall contain one compulsory question on Graphic Statics.

dressing stone; choice and suitability of materials for manufacture of bricks and tiles and different methods of manufacture of same.

(*b*) *Limes, Cements, Mortars and Concrete*:—Different varieties; their properties, tests and uses; choice and suitability of materials for manufacture of limes and cements, and methods of manufacture of same. Standard mixtures for different purposes. Artificial stones, their preparation and uses.

(*c*) *Timbers*:—Varieties, classification, characteristics, tests and uses of Indian timbers. Defects in timber and causes of decay. Seasoning and preservation. Fire proofing. Market forms and standard sizes for different purposes.

(*d*) *Iron and Steel*:—Varieties, classification, composition, characteristics, tests and uses of iron and steel. Important iron ores and their properties. Preparation and treatment of ores for smelting. The blast furnace and its accessories. Manufacture of iron and steel by different processes. Modern steels and alloy steels, their properties and uses. Different purposes and general foundry practice. Rolling mills for mild steel section and types of British Standard Selections. British Standard Specifications for structural steel. Detection of defects and flaws in iron and steel.

(*e*) *Paints and Varnishes*:—Different kinds of paints and varnishes and other protective coverings used in building construction, their preparation, properties and uses.

(*f*) *Miscellaneous Materials*:—Other metals and non-metals commonly employed in building construction, their properties and uses.

(*g*) *Glasses*:—Special varieties.

(*h*) Patent materials in the market.

(6) GEOMETRICAL DRAWING.

Practical Plane Geometry.—Construction and use of scales. Areas of plane figures. Methods of drawing ellipse, parabola, hyperbola, cycloidal and involute curves and the helix.

Practical Solid Geometry:—Projections of points, lines and planes. Projections of simple solids, prisms, pyramids, cylinders and cones. Development of plane and curved surfaces, interpenetration of solids, cylinders, cylinders and cones, prisms and pyramids. Isometric projection and elements of perspective.

(7) MATHEMATICS II.

Integral Calculus.—Integration of standard forms, integration by substitution, by partial fractions and by parts; simple formulæ of reduction; Integration as a process of summation; Areas and length of plane curves; volumes and surfaces of solids of revolution; Double integrals.

Dynamics :—Composition and resolution of velocities and accelerations ; relative velocities, linear and angular; motion in a straight line with constant acceleration; Newton's laws of motion; momentum and impulse; Principles of conservation of momentum and energy.

Hydrostatics:—Transmission of fluid pressure; thrust of fluid on plane and curved surfaces; centre of pressure; thrust of fluid on bodies wholly or partly immersed; conditions of equilibrium of floating bodies; stability of floating bodies; meta centre.

Pressure of atmosphere—Boyle's Law.

(8) ELECTRICAL ENGINEERING.

1. *Electrical Circuit*:—Practical system of electrical units. Conductors and insulators. Specific resistance. Temperature coefficient. Series and parallel grouping of resistances. Kirchoff's circuit laws and application.

2. *Electro-magnetism*:—Magnetising Force. Magnetic induction. Permeability. B. H. Curve and its determination. Hysteresis and determination of hysteresis loss. Calculations of simple magnetic circuits. Lifting Power of Electro-magnets.

3. *D. C. Machines*:—Component parts of a Dynamo and their functions. Magnetisation curve. Self excitation and voltage drop on load of shunt generator. Characteristics of compound generator. D. C. Motor. Elementary theory of operation and characteristics of shunt and series motors. Change in speed and direction of rotation. Starter and field regulator.

4. *Alternating Currents*:—Production of alternating voltage. Wave form, frequency and amplitude. R. M. S. Value, Average value, Form factor for sinusoidal alternating currents and voltages. Phase difference. Vector addition of sinusoidal current and voltages. Inductance, reactance, and impedance. Power and Power factor. Solution of simple series and parallel circuits.

5. *Measuring instruments*:—Working principles and the use of moving iron and moving coil ammeters and volt-meters, D. C. Energy Meters in common use and Megger.

6. *Storage Batteries.*—Construction, physical and chemical changes during charge and discharge, capacity, efficiency and comparison of lead and nickel iron batteries.

7. *Distribution*:—Two wire and three wire D. C. Systems. Calculation of voltage drop and efficiency. Comparison of the two systems. House wiring and accessories. Testing of faults in house wiring.

(9) MECHANICAL ENGINEERING.

Introduction:—Mechanical Engineering and its relation to other branches of Engineering. Method of cultivating the habit of accurate observation of important details. The Engineer's note-book.

Design, drawing, manufacture and maintenance:—General survey of a complete steam power plant and internal combustion engine, power plant. Diagrammatic sketch and explanation. Carnot's cycle and other heat engine cycles and their relation to heat engines.

The Boiler:—Simple vertical boiler; sketch and names of the principal parts. Solid, liquid and gaseous fuels suitable for steam raising purposes. Calorific values, combustion and draught.

Improvements to boilers for increasing the heating area and water circulation.

The Steam Engine:—Single cylinder non-condensing steam engine with D slide valve. Sketch and names of principal parts. Explanation of admission, cut off, release and compression: valve mechanism. Principle underlying expansion in stages. Arrangement of cylinders for compound, triple and quadruple expansion engines. General ideas regarding Meyers, Trip and Corliss valve gear. Lubrication and jacketing of cylinders.

The Steam Turbine:—Parsons and DeLaval Steam turbine. Sketch and explanation of its working.

Internal combustion engines:—4-stroke and 2-stroke cycle engines. Sketch, working and names of the principal parts. Classification—high speed, medium speed and slow speed. Low compression, medium compression, high compression and Diesel engines. Fuels for internal combustion engines and their relation to speed and compression. Carburettors, fuel pumps, Magnetos, coil ignition, vaporisers and hot bulbs. Lubrication and cooling of the cylinder.

The suction gas Engine:—Sketch, working and names of the principal parts of the gas plant; fuels for the gas plant.

Testing of Engines:—Indicator and Indicator diagrams. Indicated H. P., Brake Horse Power, Fuel consumption, Mechanical and Thermal efficiencies. Simple problems.

Transmission of Power:—Gear drive, belt drive, rope drive and chain drive, velocity ratio. Simple problems.

Manufacturing methods and workshop practice:—General ideas of forging, casting, machining and fitting. Simple illustrations of the complete manufacture of a machine part or engine embodying the above. Elementary ideas of a lathe, shaping, planing, drilling and milling machines and the kind of work turned out by each machine.

A brief summary of the materials used in machine construction. C. Iron, W. Iron, M. Steel, Carbon Steel and Alloy Steel: copper and its alloys; aluminium and its alloys.

The lectures are to be supplemented by periodical visits to Mechanical Laboratory, Power House and Workshops. In addition the students will attend workshop classes of 2 hours per week.

(10) MACHINE DRAWING AND DESIGN.

The use of drawing instruments.—Printing, conventional signs, Inking and colouring. Bolts, nuts and rivets, proportions, riveted joints. Pipe joints. B. S. specifications; ball, socket and flange. *Shaftings and couplings*; flange, muff, claw and flexible. Keys and keyway; Jib, feather and woodruff. Splined shafts; Bearings and journals. Brackets; ceiling and wall Pulleys, C. Iron W. I. Gear drive, rope drive, belt drive and chain drive.

Steam and Internal Combustion Engines—Cylinder, piston and slide valve. Eccentric sheave, strap and valve rod. Crosshead, guides and gudgeon pin. 4-stroke and 2-stroke engine cylinder and piston. Valves and valve mechanism. Timing gear, cam shaft, tappets and rockers. Connecting rod and crankshaft; Fuel pumps and atomizers.

N. B.—The students must be able to copy to scale and produce neat working drawings. Given the main dimensions they must be able to fill in proportionate details with the aid of standard hand-books.

Book recommended:—

First Year Drawing by Parkinson.

(11) APPLIED MECHANICS II*

Beams:—Cantilever, simply supported and overhanging beams subject to symmetrical or unsymmetrical static loading and fixed beams only subject to symmetrical static loading—calculation and graphical determination of bending moments and shear forces; relation between load distribution, shearing force and bending moments. Theory of simple bending— proofs of formulæ and their application. Strength of beams.

Deflection:—Relation between curvature, slope and deflection; Proofs of standard formulæ and their applications. Stiffness of beams. Evaluation of deflection from bending moment diagrams.

Fixed beams.—B.M. and S.F. diagrams under symmetrical loading. Calculation and graphical determination of slope and deflection under such loading.

Thin Cylinders :—Stresses and strains in thin cylinders subject to uniform internal or external pressure or both.

Columns and Struts:—Long and Short columns; axial and eccentric loading, effect of end conditions; equivalent lengths and slenderness ratio; eccentricity factor; column formulae, their derivation and practical applications; laterally loaded columns and struts.

Distribution of shear stresses in a beam section.

(12) CIVIL ENGINEERING II.

Building Construction.—

General :—Preliminary investigations as to suitability of site for different types of buildings; trial pits and borings; determination of bearing capacity of soils, etc.

Foundations :—Drainage of building site; excavation and trenching; methods of timbering excavations; shoring and under-pinning; methods of improving bearing capacity; ordinary foundations such as masonry footings, grillage and pile foundations and simple calculations pertaining thereto.

Plain Masonry and Brickwork:—Different kinds of bonds and methods of laying; coursed and uncoursed rubble, ashlar, coping,

*The question paper shall contain one compulsory question on Graphic Statics.

cornice and string courses; finishing and painting; damp-proof construction; anchorages in walls; fire resisting construction for flues, chimneys and fire places; dressing such as door-jambs and door and window sills; flat, segmental, pointed and relieving arches; inverts; centering for arches and striking of centres; vaults and domes.

Floors and Roofs:—Floors of different materials; terraced and pitched roofs; jack-arched floors and roofs; steel beam and girder floors—simple design calculations; timber, mild steel and composite roof trusses—simple design calculations; different types of roof coverings and ceiling and constructional details.

Carpentry and Joinery:—Different kinds of joints in timber; doors, windows and ventilators; partitions; scaffolding and false-work; simple roof and bridge frames.

Stairs:—Different types of stairs—straight and spiral—in timber, plain masonry, iron and concrete, simple design calculations.

Columns:—Details and methods of construction in brick stone, iron and concrete.

Scaffolding—materials used and principles of erection and maintenance.

Hoisting appliances—construction and maintenance.

Safety measures—organisation and supervision—safety regulations.

(13) SURVEYING.

Chain Survey:

Equipment—pacing—ranging and chaining lines—errors in chaining.

Methods of avoiding obstacles—problems in ascertaining distances, setting out a right angle.

Offsets—Tie lines.

Optical squares—cross staves.

Scales and R. F.

Plotting—computing areas—Simpson's rule.

Compass Survey:—

Prismatic compass—description, use, and adjustments.

Bearings—local attraction.

Magnetic and true meridians—variation—declination.

Plotting—graphical adjustment of error of closure.

Plane-Table Survey :—

Equipment—setting and use of plane table.

Alidades—simple and prismatic.

Resection—3 and 2 point problems.

Levelling:—

Level types—Cushings, Cooke's Reversible, Dumpy.

Setting up, use, adjustments.

Staves.

Spot levels—Fly levels—Bench marks—profile levelling—cross-sections.

Curvature—refraction—reciprocal levelling.

Contouring—clinometers—earthwork and capacity of reservoir—areas—volumes.

Field Books—types—arithmetical checks.

Plotting of longitudinal sections.

Allowable errors.

Setting out of Works :—

Curves, without angle measuring instruments.

Building—erection of profiles for banks.

(13-a) GENERAL TEXTILE TECHNOLOGY.*

(14) BUILDING DRAWING.

(*a*) Detailed drawing of building details as dealt with in Building Construction course (*vide* syllabus for Civil Engineering II).

(*b*) Working drawings of small buildings from sketches and specifications together with simple design calculations.

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* Common with B.Sc. (Tech.)—See under Textile Technology.

THIRD AND FINAL B.E. DEGREE EXAMINATIONS.

(1) MATHEMATICS III.

Differential Calculus:—Curvature; evolute, involute; envelopes; Taylor's and Maclaurin's series and their applications; Partial differentiation.

Differential Equations:—Ordinary differential equations involving two variables—equations of the first order and first degree. Standard forms; the general linear equation with constant co-efficients—the method of solution by operators; equations reducible to the linear form with constant co-efficients. Simultaneous linear equations of the first and second order with constant co-efficients.

Dynamics of a particle—

(i) *Rectilinear motion*:—Equations of motion; simple harmonic motion; motion in a resisting medium.

(ii) *Motion in two dimensions*:—Cartesian co-ordinates—Composition of simple harmonic motions; motion of a projectile in a vacuum and in a resisting medium; equation of energy.

Polar Co-ordinates:—Velocity and acceleration in polar co-ordinates; central forces; Differential equations of orbit; Law of inverse square.

Constrained motion:—Tangential and normal acceleration; motion on a smooth or rough curve in a vertical plane.

*(2) STRENGTH OF MATERIALS AND THEORY OF STRUCTURES I.

1. *Compound Stresses and Strains*:—Stresses under combined strains, principal stresses and principal planes; ellipse of stress; application to different cases.

2. *Behaviour of Materials under Test*:—Methods of testing and appliances used in determining the elastic constants and testing materials to destruction under tension, compression, shear, torsion and bending; impact and hardness tests; tests under repeated and alternating stresses; fatigue of metals; factors of safety and working stresses, latest advancements in the science of testing materials.

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* The question paper shall contain one compulsory question on Graphic Statics.

3. *Circular Shaft:*—Theory of pure torsion, shear stress, angle of twist, strength and resilience; horse-power transmission; combined torsion and bending with or without end thrust; determination of principal stresses and maximum shear stresses; equivalent bending moments and equivalent twisting moments.

4. *Helical Springs:*—Extension under axial pull and maximum shear stress; angle of twist and torsion and maximum direct stress; strength and resilience.

5. *Thick shells and cylinders:*—Stresses and strains under internal and external pressures.

6. Deflection of frames, Castigliano's Theorem I. Resilience due to bending moment, shear and torsion.

7. *Continuous beams and propped cantilevers:*—Theorem of three moments; calculation and graphical determination of reactions, bending moments, shear forces, deflection and slope—Moment distribution methods.

8. *Masonry Works. General conditions in stability:*—Middle third rule—lines of resistance—Distribution of pressure intensities—elementary principles of design of masonry dams, gravity section.

(3) HYDRAULICS I.

(*Common for Civil, Mechanical and Electrical Branches*)

Fluids at rest:—Properties: Intensity of pressure: transmissibility and measurement of pressure; total pressure; centre of pressure.

Floating bodies. Equilibrium, stability, metacentre.

Fluids in motion:—Ideal fluid—Steady and unsteady motion—stream line—Bernoulli's theorem. Applications—Venturi meter—Vortex motion.

Orifices and notches:—Standard conditions—Co-efficients of contraction, velocity, discharge and their determination for small orifices. Form of jet—Suppressed contraction—Large orifices—Drowned and partially drowned orifices—velocity of approach—Sudden expansion and contraction—mouth pieces—time of discharge. Weir: standard conditions—Rectangular—End conditions—Triangular, trapizoidal, velocity of approach: drowned weirs—Height of sill—Nappe and its stability—Flat crested weirs—Gauging Weirs—weirs and anicuts—Bridge openings—Sluices.

Pipes:—Fluid friction—Viscosity—Turbulent motion—Critical velocity—Loss of head and hydraulic gradient—Straight and circular

pipes of uniform diameter and hydraulic mean depth—Empirical formulae, Chezy, D'Arcy, Kuttur and Logarithmic—Bends—Elbows—Valves—Variation of velocity in cross section—practical problems—Diameter of pipes—Branch pipes—Hydraulic transmission of power—Variable diameter—Syphons—Hammer action.

Open channels—Discharge formulae—best form of channel—gauging of discharge, methods and instruments used.

(4) STRUCTURAL ENGINEERING I.

Foundations:—Difficult foundations such as coffer dams, well foundations, cylinder foundations, cribwork and caissons and concrete monoliths—details of construction and methods of working.

Masonry:—Retaining walls and dams; Practical profiles; data, formulae and empirical rules for design; methods of relieving side pressure and improving stability; provision for drainage; expansion joints, other important details of construction; detailed design of gravity and panelled retaining walls and gravity and arched masonry dams.

Bridges aud culverts:—Data for design; practical rules for design, waterway for bridges and economical spacing of piers, usual dimensions for highway and railway bridges; provision for drainage; design of piers and abutments; detailed design of arched bridges and culverts for specifications and empirical rules.

Reinforced concrete:—General principles: Theory and design of rectangular beams, tee-beams, slabs and columns; arrangements of laying reinforcement; leading systems of reinforcement; economical methods of construction; design and details of form-work.

Buildings:—General principles of design, methods and details of construction, detailed design of different types and parts of buildings.

Structural steel work:—Beams and girders; Properties of British Standard sections; detailed design of beams, compound girders, built-up plate girders and lattice girders, limiting spans and economical depths, designs of flanges and webs, curtailment of flange plates, determination of size, pitch and arrangement of rivets; types of stiffeners and rules for their spacing; design of joints and connections; methods of fabrication; detailed design of crane and gantry girders of built-up plate and lattice girder types and typical details of construction.

Columns and struts:—Plain and built-up sections; assumptions regarding end conditions; practical formulæ for design; detailed

design of stanchions for buildings and of compression members of roof trusses and lattice girders; design and details of caps, bases and brackets for stanchions, joints and splices on stanchions; size, pitch and arrangements of rivets on flanges of plated stanchions, lacing on stanchions.

Roof trusses:—Types of roof trusses; limiting spans, rise and camber; economical spacing; data for design; detailed design of members including purlins, joints and connections; wind bracing on roof trusses, detailed design of steel-framed sheds.

(4-a) AUTOMOBILE ENGINEERING.

SPECIFICATIONS.

Engine Types:—T head, L head, overhead and sleeve valves.

Cylinders:—Separate, and unit construction.

Arrangement:—Straight, Vee and opposed. Cylinder heads and liners; wet and dry liner assembly.

Pistons:—Cast Iron, Aluminium alloy, composite and bimetal.

Connecting rods:—Steel and alloy.

Crankshaft:—Construction, balancing and vibration dampers.

Clutch:—Hele-Shaw, multiplate dry and single plate dry.

Flywheel:—Ordinary and fluid.

Carburettor:—Ordinary and down draught.

Ignition:—Magneto and coil.

Petrol feed:—Gravity, vacuum, diaphragm and electric pump.

Gear box:—Clash type, constant mesh, synchro mesh and pre-selective. Hydraulic and other gearless transmission.

Transmission:—Cardan shaft, universal joints, crown and bevel, worm gearing and chain.

Differential and back axle: fully floating, three quarter and semi-floating.

Chassis and its components:—Front axle and springs, wheels and tyres.

Starting and lighting systems:—American, British and Continental.

Lubrication and cooling of cylinders:—Low pressure and high pressure systems. Radiator construction, air-cooling, water-cooling,

steam cooling and oil cooling. Thermostat control of radiator temperature.

General:—Wheel alignment, service; upkeep, maintenance and repairs.

High speed Diesel Engines used for automobile work.

(5) RAILWAY AND HIGHWAY ENGINEERING.

RAILWAY ENGINEERING.

Permanent Way—Ballast, sleepers, rails, chairs and fastenings.

Points and Crossing:—Details of construction, different types, turnouts, cross-overs, slips—formulæ and practical rules for setting out.

Plate Laying and Maintenance—of track, Super-elevation, creep of rails.

Station Works and Machinery:—Station buildings, Platforms, sidings, signals and signal mechanism, staff quarters, engine sheds, turn-tables, triangles, water columns, ashpits.

MECHANICS OF RAILWAY TRACTION.

Station Yard design:—Single and double lines, stations, passenger and goods yards, section yards and junctions.

Signalling and Interlocking:—Uses of signals, absolute block system, principles and mechanisms of interlocking, Key and tappet systems, detectors, treadle bar, compensators, slotting arrangement.

Selection of alignment and Surveys:—Classification of railways. Preliminary investigations, reconnaissance, preliminary and location surveys, curves and the gauge problem.

Tunnels:—Construction of Tunnels in different soils, drainage and ventilation—Subaqueous tunnels, shield tunnelling, tunnelling between coffer dams, tunnelling under compressed air.

Standard dimensions on Indian railways, rules for preparation of railway projects.

HIGHWAY ENGINEERING.

Importance of roads; classification of roads; preliminary investigations; reconnaissance surveys; consideration affecting alignment, obligatory points, grades, ruling gradients, curves and widths; availability of materials of construction; different types of roads and

pavements; methods of construction, materials of construction, their tests, properties and specifications: treatment of road surfaces; sub-drainage and surface drainage; pipes, drains, gutters and culverts; sections of roads; camber and crown formulæ; hill roads and causeways; construction and maintenance of embankments and cuttings; repair of roads, road signs, side walls, curbs, railings, etc. Arboriculture; rules for preparation of road projects. Standard specifications for different types of roads. Machinery employed for construction, maintenance and cleaning. Latest advancements in highway engineering.

Note.—(1) Earthwork calculations are dealt with under Surveying.

(2) Highway bridges are dealt with under Structural Engineering I and II.

(6) GEOLOGY.

Mineralogy.—Principal physical properties of minerals. The chief characteristics of the rock forming minerals; quartz, felspar, mica, pyroxenes, amphiboles, olivine, garnet and epidote.

Petrography.—Composition of earthcrust. Division into igneous, sedimentary and metamorphic rocks; classification of igneous rocks. Granite, syenite, dicrite, gabbro, nerite, peridotite, pitche-stone, porphyry, dolerite, obsdion, pumice, trachyte, andesite and basalt.

Sedimentary rocks and the more important metamorphics, their distinguishing characteristics and mode of formation.

Structural Geology.—Stratification, dip, strike, outcrop, outlier, inlier, folds, faults, cleavage, joints, unconformity and overlap. Batholiths, laccoliths, sills, dykes and eruptive veins.

Civil Engineering Geology.—The physical properties, selection and distribution of building stones and materials. Road foundations. Properties and selection of road metals. Principles governing the economic quarrying of stone and selection of quarry sites.

Stability of slopes and land slides affecting cuttings, embankments, reservoirs, sites, etc. The texture, porosity and structure of rocks affecting tunnelling, sinking shaft.

Water supply—Rainfall considerations. Underground water circulation. Artesian wells.

Indian Geology.—The geological history of India in broad outline. The distribution of the stratified and igneous rocks in India. Occurrence of the important ores and minerals of India.

Practical.—The practical will include determination of the more important rocks and minerals with the aid of simple physical tests.

*(7) STRENGTH OF MATERIALS AND THEORY OF STRUCTURES II.

1. Theories of earth pressures—Graphical constructions—Retaining walls—Rankine's theory applied to foundations.

2. *Moving Loads and Influence Lines.*—Curve of maximum bending moments and maximum shear forces; the enveloping parabola and determination of equivalent uniformly distributed load; influence lines for reaction, shear force, bending moment and deflection; influence lines for forces in members of braced girders and spandril-braced arches; reversal of stress under live load.

3. *Suspension Bridges and Arches*:—Stresses in loaded cables and hanging chains; stiffening girders; moments and shears in such girders; elastic theory of the rigid arch; Eddy's Theorem; stresses due to rib-shortening and temperature changes; reaction and horizontal thrust in rigid, two-hinged and three-hinged arches; reaction loci; lines of resistance through rigid and hinged arches under dead and live-loading.

4. *Structural Frames*:—Calculation and graphical determination of forces in members of roof trusses with knee braces, in braced girders of variable depth with or without secondary members and in trestles; displacement diagrams for braced girders; analyses of simple types of indeterminate frames. Portal and sway frames.

(8) STRUCTURAL ENGINEERING II.

Reinforced concrete—Bridges.—Detailed design of different types of highway bridges.

Tanks and Towers.—General principles of design; methods and details of construction, detailed design of low and high tanks from specifications.

Retaining walls.—Cantilever and Counterfort types—their detailed design from specifications, methods and details of construction.

* The question paper shall contain one compulsory question on Graphic Statics.

Miscellaneous structures.—General principles relating to the design and construction of bunkers, gantries, domes, jetties, pile and raft foundations.

Structural steel work—Bridge work.—Data for design, detailed design of highway and railway bridges of plate and lattice girder types, economical proportions, standard dimensions, minimum clearances and head room: different types of floors, transverse and lateral bracing; end bearings; provisions for drainage; other important details of construction. Important considerations and general principles relating to the design of cantilever, suspension, swing, lift and bascule bridges.

Miscellaneous structures.—General principles relating to the design of tanks and towers, structural parts of cranes, tall chimneys, bunkers, domes, jetties, pipe lines, etc.

Timber.—General principles of design in timber with special reference to structures, such as, roof trusses, beams and columns, bridges, trestles and form-work for reinforced concrete structures.

Erection.—General methods of erection of buildings and bridges.

(9) HYDRAULICS AND HYDRAULIC MACHINERY II (CIVIL).

Open Channels.—Non-uniform flow, hydraulic jump, venturi flame.

Impact of water on vanes.—Pressure of jet on stationary and moving, flat or curved vanes. Work done and efficiency.

Turbines—Classification, reaction, impulse, inward, outward, and mixed flow; Pelton wheel; specific speed; characteristic curves. Principle of similarity and its application to model testing—Propeller turbines.

Pumps.—Reciprocating pumps—types—work done—effect of acceleration and frictional resistance—separation—air vessels.

Centrifugal pumps—vortex chamber—pressure in the pump, specific speed. Principle of similarity, characteristic curves—application of principle of similarity to model testing, multi-stage pump.

(10) CIVIL ENGINEERING, DRAWING AND DESIGN I.

(*a*) Designing and detailing important types of buildings, bridges and culverts in plain masonry or timber.

(b) Designing and detailing steel-work for steel framed buildings, plate and lattice girder bridges (road or railway) tanks and towers.

(c) Designing and detailing reinforced concrete buildings, highway bridges, retaining walls, and towers.

(11) SURVEYING.

Instruments:—Use and adjustments of:—

Theodolite—transit, micrometer, double-reading, and photo.

Levels. Engineers improved level (Government of India pattern) Zeiss, and gradienter.

Sextants—Nautical and Box.

Solar attachments—Burt and Saegmuller.

Telescopic alidade and plane-table equipment—Mining dial—Direct reading tacheometer—Curve ranker—Equatorial mounting.

Traverse Surveying:—

Stations.

Angles by repetition.

Gale's method of plotting by co-ordinates.

Distribution of errors.

Setting out of Works:—

Curves by theodolite—simple, compound, transition.

Curve tables.

Setting out and measuring engineering works.

Tacheometric Surveying and Subtense Measurements:—

Principle of Stadia—Formulae.

Field observations.

Staves—Subtense bar.

Field book—reduction by diagram, tables, slide rule.

Plotting by tacheometric protractor.

Triangulation:—

Minor triangulation—Choice of stations—triangles, quadrilaterals—interlaced polygons.

Signals—Erection—heliotrope.

Field observations—angles by reiteration—vertical angles for heights.

Satellite stations—3 point problem-intersected points.

Base-line—Instruments and accessories—invar tape corrections—reduction of measurements.

Adjustment of angles by method of equal shifts—least squares.

Calculation of co-ordinates—plotting.

Precise Levelling—Maps snd map making—problems in heights and distances.

Astronomical Surveying:—

Spherical trigonometry—formulae.

Convergence of meridians.

Definitions—approximate motions of sun and stars.

Nautical almanac—use.

Methods and calculations for determination of true meridian, latitude, longitude, and time.

Hydrographic Surveying:—

Soundings. Charting.

Cross-sections of streams and rivers—discharge of rivers.

Tides and tide-reduction.

(12) IRRIGATION, DOCKS AND HARBOURS.
IRRIGATION ENGINEERING.

General:—Importance of irrigation works; productive and protection of works; projects. General principles of flow, lift perennial, basin or inundation, and well irrigation; principal crops; duty, factors affecting duty for crops under storage and direct flow irrigation, duty in Madras systems. Rainfall and Run off—study of rainfall statistics; utility in run-off calculations; flood discharge and its estimation. Percolation, evaporation and absorption losses in canal and storage systems; uplift and piping; stability of works affected by percolation. Silt-analysis; silting of reservoirs; flow in canals, Kennedy's critical velocity and its applications.

Diversion Works:—General description of rivers, river weirs; selection of sites; types on permeable and impermeable soils; weir

crest shutters; principles governing the design and construction of river regulators, head regulators, undersluices, flood banks, and protective works. Retrogression of levels.

Storage Works:—Selection of site; masonry dams; principles of; design of gravity, arch and other types; uplift in masonry dams; drainage galleries; expansion joints; methods of construction. Earthern dams; causes of failure; types of dams; materials for dams, methods of construction, drainage of earthern dams and foundations. Component works—sluices, surplus escapes; ordinary types, stepped waste weirs, syphon spillways; selection of sites. Tanks—isolated and rainfed—single or in groups, supply, capacity. Repairs to bunds and breaches. Flood absorptive capacity of reservoirs; formulæ for design of weirs.

Distribution Systems:—Design and alignment of canals, distributaries, etc., in deltaic and non-deltaic countries; capacity, command, limiting, velocity, etc. Drainage, necessity, water logging, alkalinity of soils, drainage, principles in design of drainage channels, outfalls; lining of canals. General description, construction and design of masonry works on canals—(*a*) for regulation of water levels—rapids, falls or drops, notches, escapes, syphon-well drops, sluices,—(*b*) cross drainage works and surplus works—aqueducts, syphon aqueducts, super-passages, level crossings, inlets and outlets—(*c*) communication works—road dams, fords, etc.

Navigation Canals:—Main features; locks, desirability of combining navigation and irrigation.

River training works:—Spurs, groynes, Bells bunds, mattresses, aprons, etc.

DOCKS AND HARBOUR ENGINEERING.

Physical geography in relation to docks and harbours; natural phenomena, prevalence and intensity of winds, coastal change; accretion and denudation; effect of artificial interference; tidal phenomena; waves-form, height and length, wave velocity and wave action.

Objects of docks and harbours; consideration affecting choice of site; entrances to docks and harbours; foreshore protection and channel regulation; wet, dry and floating docks; tidal basins and harbour, different forms and types; detail and methods of construction. Lock gates, their construction and working, machinery employed. Different types of quay walls, their construction and maintenance;

signals and light houses, ferries and landing piers. Description of important existing docks and harbours. Latest advancement in dock and harbour engineering.

(13) SANITARY ENGINEERING.

WATER SUPPLY.

Bacteriology:—Application to analysis of water and sewage.

Sanitary Engineering:—Scope and objects.

Water Supply:—Importance, ancient and modern waterworks, quantity required.

Sources:—Rain, wells, springs, rivers, lakes.

Wells:—Geology, shallow, deep and artesian wells. Construction, yield, quality.

Rivers:—Trenches, infiltration gallery.

Storage reservoirs:—Site, capacity, compensation water, dams, form, design, construction, waste weirs, outlet conduits, valve tower.

Conveyance:—Pipe lines—Hydraulic gradient, types of aqueducts, syphons; air valves, balancing reservoirs.

Service reservoirs:—Open and closed reservoirs, capacity and construction, water towers, elevated tanks, stand pipes.

Pumps and Pumping:—Pumps and suitability, pumping station.

Purification:—Sedimentation, coagulants, effects of storage on purification, infiltration galleries.

Slow filtration:—Filter beds, area, size, arrangement of sand-layers, materials and construction, rate of flow, regulation, cleaning, remarks

Rapid filtration:—Types of filters, rate of filtration, operation of mechanical filters.

Sterilization:—By chlorine, light, electricity, etc.

Softening:—Hardness in water, methods of softening.

Distribution:—Combined and dual systems, intermittent and constant supply, mains and branches, methods of arranging distribution pipes, watering posts, fire hydrants, taps, house fittings.

Waste detection and prevention:—Meters.

SEWERAGE AND SEWAGE DISPOSAL.

Refuse collection and disposal:—Sanitary arrangements in houses, house refuse, sullage, nightsoil, conservancy systems. Collection and removal. Disposal on land. Incinerators, destructors.

Trade Effluents:—Their treatment.

Drainage and sewerage:—Rainfall, house drains, surface drains, underground sewers, combined, separate and partially separate systems of sewerage. Measurement of sewage flows, branch and main sewers, design and construction of manholes and sewers, ventilation and cleansing, self-cleaning velocity, excessive and inadequate falls, automatic flushing, lifting of sewage, pumps, ejectors, lifts, intercepting and outfall sewers and their ventilation, storm overflows, outfall into sea.

Sewage disposal:—Character and composition of sewage, disposal on land, board irrigation, intermittent irrigation; sewage sludge, utilisation as manure, disposal in the sea.

Bacterial purification:—Contact beds, intermittent sand filtration, precipitation, septic tanks, trickling filters, sludge, disposal of sludge, activated sludge, design of disposal works.

Public utilities:—(Water works, sewerage and sewage disposal) hospitals, libraries, fire stations, schools, markets, burial and burning grounds, slaughter houses, public baths, parks and play-grounds, theatres and cinema halls, etc.

(14) CIVIL ENGINEERING, DRAWING AND DESIGN II.

(*a*) Designing and detailing important types of irrigation works, such as, tank surplus weirs, regulators, drops, syphon aqueducts, superpassages, escape locks, etc.

(*b*) Designing and detailing types of works relating to Sanitary Engineering.

(15) HEAT ENGINES I.

Thermodynamics:—Units of heat. Heating and expansion of gases. Internal energy of a gas. Laws of perfect gases. Air cycles. Carnot's, Otto, Diesel and dual combustion cycles. Entropy of gases.

Internal Combustion Engines:—Gas and petrol Engines, Oil Engines. Diesel and semi-Diesel Engines. Working and features of two and four stroke cycles. Efficiencies and Engine tests.

Air Compressors:—Single and multi-stage compressors. Inter-cooling, conditions for maximum efficiency.

Refrigeration:—General principles. Types of mechanical refrigerators, vapour compression refrigerators. Co-efficients of performance. Choice of vapours for commercial refrigerators.

Engine Details:—Cylinders, pistons, connecting rod, crank shaft, bearings, bed plates, timing gear, cam shaft, valves, fuel injection, electrical ignition and governors, lubrication and cooling of cylinders, starting arrangements.

(16) ELECTRICAL TECHNOLOGY I.

General Principles:—Electric and Magnetic Laws, Units and Standards. Electric and Magnetic Properties of Materials. Electric and Magnetic circuits. Magnetic measurements of permeability and hysteresis.

Measurements:—The Principles and construction, use and calibration of instruments ordinarily employed; moving coil, soft iron, dynamometer, thermal and electrostatic types. Direct current energy meters. Megger.

Generators and Motors:—Continuous current generators and motors; shunt, series and compound types; construction, working and simple theory. Types of windings; lap and wave. E. M. F. equation. Armature reaction. Tests by direct and indirect methods. Parallel operation, and sharing of loads between generators. The third brush and Rosenberg generators.

Batteries:—Secondary cells. Elementary theory and testing. Practical applications of storage batteries.

Illumination:—Units and Standards. Polar Curves. Use of Shades. Photometry.

Alternating Currents:—Elementary theory of single and polyphase currents.

Transformers:—Single and polyphase transformers and their construction. Tests of efficiency and regulation by direct and indirect methods on single phase transformers. Polyphase transformers.

(17) HEAT ENGINES II.

Heating circuit:—Properties of Steam; wet, dry and super-heated; internal energy of steam. Use of steam tables. Carnot's cycle with steam as working agent. Entropy of steam. Temperature entropy

diagram. Total heat entropy diagrams. Expansion of steam, Rankine cycle applied to steam and modifications. The indicator diagram, hypothetical and actual. Theory of steam engines. Una flow simple and multiple expansion engines. Actual performances of steam engines. Losses and methods of reducing them. Efficiencies in practice. Engine trials. Heat balance sheet, variation of steam consumption with H. P., governing.

Steam Nozzles:—Flow of steam through nozzles, velocity of expanding steam. Nozzle form and general relations for frictionless adiabatic flow Effect of friction. Supersaturated flow.

Turbines:—Impulses and reaction pairs, work done by a pair. Velocity diagram for moving blades. Blade friction. The DeLaval Turbine. Impulse turbine with several blade rings. Velocity diagram for axial discharge. Compounding for pressure and velocity.

Parson's reaction turbine. Velocity diagrams. Height of blades in reaction turbines. Increasing output and efficiency of turbines by reheating and bleeding of steam.

Engine details:—Cylinders, pistons, valves, piston rods, stuffing box, gland and packing, connecting rods, crosshead and guides. Crankshaft, bearings and bed plate. Governors. Condensers and pumps; lubrication and jacketing of cylinders.

Turbine details:—Shafts, reduction gear and blading. Nozzles and governors. Lubrication and jacketing of casing.

Valves and Valve gears:—Valves for stationary and locomotive engines. D slide valves, piston valve and Meyers expansion valve; link motion and radial gears. Corliss valve, Drop valve and trip gears. Valves for internal combustion engines. Poppet valve and sleeve valve; valves for air compressors. Valve Diagrams.

(18) ELECTRICAL TECHNOLOGY II.

A. C. Generators:—Single and polyphase; construction, working and simple theory. Tests of efficiency and regulation by direct and indirect methods.

A. C. Motors:—Synchronous motor, construction, working and simple theory; current locus at constant voltage excitation; variation of current and power factor with changing excitation; hunting and prevention. Polyphase induction motor; squirrel cage and slip ring types: simple theory, working and construction; rotating field; direct and indirect tests on performance; the circle diagram; methods

of starting. Simple theory and operating features of the single phase induction motors, series motors and schrage motors.

Synchronous Converter:—Simple theory and operating features.

Measurements:—The Principle of construction, use and calibration of A. C. Instruments ordinarily employed. The Duddell Oscillograph. The synchroscope. Single phase power factor meter.

Transmission and Distribution:—Transmission and distribution of electrical energy. Calculation of size of conductors. General methods of erecting, laying and insulating.

(19) THEORY OF MACHINES.

Kinematics and pure mechanism:—Definition of a machine, machine elements, links, chains and mechanisms.

Constrained Motion:—Translation and rotation; instantaneous centres, velocity and acceleration diagrams. Inversion of Mechanisms. Quick return motion, slider crank chain.

Transmission of Power:—Wheel Trains, simple, compound and epicyclic. Chain, belt and rope drives.

Friction of rest and motion:—Screw threads, thrust bearing, clutches and brakes, worm gear and cams.

Reciprocating Engine:—Velocity and acceleration of piston and connecting rod, inertia effects, turning moment, diagram, fly-wheel. Balancing of Engines, primary and secondary effects.

Theory of Governors.

Vibrations:—free, forced, viscous, damping.

Whirling of shafts:—torsional oscillations.

Gyrostatic action.

Stresses in thick cylinders:—Rotating discs.

Lubrication:—Properties of lubricants, testing; types of lubricators.

(20) HYDRAULICS AND HYDRAULIC MACHINERY II.

(MECHANICAL AND ELECTRICAL).

Water Turbines:—Pressure of a jet on stationary and curved vanes. Reaction turbines; outward, inward, axial and mixed flow. Pelton wheel, specific speed. Speed regulation. The Francis and Kaplan turbine. General features of a hydro-electric plant.

Reciprocating pumps:—Types, work done, slip and co-efficient of discharge. Effect of acceleration, slip and cavitation. Air vessels. Direct acting pumps Deep well pumps.

Centrifugal pumps:—Whirlpool and Vortex chambers, specific speed, turbine pump—Multistage pump.

Pumps—General:—Hand pump. Pulsometer pump, Humphrey gas pump, Hydraulic ram and air lift pump.

Hydraulic appliances:—Hydraulic jack, riveter, accumulator, intensifier, presses, canes and lifts, valves, joints, packings, meters, etc.

(20-a) AERO-ENGINEERING.

I. Aero-dynamics.

1. The atmosphere.

2. Fluid Mechanics.

3. Basic ideas of wing theory—flow around an aerofoil. Theory of aeroplane wings of infinite span. Mathematical foundation of the theory of wings with finite span. Aerofoils and aerofoil systems of finite span. Theory of the wake.

4. Mechanics of viscous fluid—boundary layer—various theories. and experiments.

5. Dynamics of the aeroplane.

6. Theory and practice of wind tunnel measurements; design data from the aerodynamics laboratories.

7. Aerial manœuvres—looping, spinning, turning and spiral glide, spiral descent, autorotation, etc.

8. Dynamical similarity and scale effects.

9. Airscrews: momentum theory and blade element theory.

10. Prediction and analysis of aeroplane performance.

11 Stability of motion of aircraft.

12. Methods of measurement in aerodynamics—various instruments.

II. Auto and Aero-engines.

Detailed thermodynamics of internal combustion engines; effects of compression ratio, mixture strength, etc. Detonation and Knock-rating; Engine cooling. Mechanical losses. The compression—ignition engine compared with petrol engine. Super charger and super-charged engines—performance of supercharged engines compared with normally aspirated engines.

The aircraft engine, general aspects, power output, fuel economy, head resistance, reliability and working life. Power required for flight equilibrium of air screw and engine, general and detailed performance—Altitude and power output. Estimates from ground tests. Measurements in flight, correction to standard atmosphere. Supercharged engines at high altitudes.

Engine accessories and installation problem. Kinematics and dynamics of aero-engine, balance, stresses in the moving parts, Valve timings and Volumetric efficiency. Future developments; the sleeve valve and two stroke engines.

III Aerodromes

Aerodromes, its importance and spacing, position and relation to the air zone.

Economics of aerodrome operation.

Traffic control in the vicinity of aerodrome and on the surface and its effect on design.

Location and design of terminal buildings.

(21) FUELS, GAS PLANTS AND BOILERS.

Boilers.

Classification of Boilers:—Cylindrical, fire tube and water tube; Marine and land types; High pressure and low pressure.

General details of Vertical, Cochran, Lancashire, Cornish, Yorkshire, Galloway, Babcock and Wilcox, Stirling, Yarrow, and Locomotive boilers. Bonecourt surface combustion boiler.

Boiler details:—Riveted joints, longitudinal and circumferential seams. End plate connections. Flues; Fox, Morrison, Deighton and suspended bulb corrugations. Manhole and hand holes. Caulking and fullering. Stays; Gusset, bolt, tube, stud, girder and sling.

Boiler Accessories:—Economiser, surperheater, air preheater, feed pump, injector, steam trap, steam separator and feed water regulator.

Boiler Fittings:—Safety valves, steam stop valves, gauge glass fittings. Feed inlet valve and blow out valve.

Boiler Draught:—Natural, artificial, forced, induced, balanced Howdens, Ellis and Eaves and closed stokehold system.

Mechanical Stokers:—Coking, sprinkling and underfeed.

Boiler feed water:—A short description of the treatment of feed water. Mechanical filters.

Boiler manufacture:—A brief description of the manufacture of a boiler, rolling of plate, flanging processes, dishing of end plates and hydraulic forging of boiler plates. Universal drills, gang drills, pneumatic drills, pneumatic and hydraulic riveters, Board of Trade and Lloyds specifications. Hydraulic and steam treats.

Problems:—Equivalent evaporation of boilers, draught, boiler trials and Heat Balance Sheet.

Boiler management and maintenance:—The economical use of fuel; automatic recorders; pressure, feed water, draught and Co_2.

FUELS AND GAS PLANT.

Classification of fuels:—Proximate and ultimate analysis. Physical characteristics, chemical composition and calorific value. Suitability for steam raising and industrial purposes.

Solid fuels:—Peat, lignite, cannel, bituminous and anthracite varieties of coal. Production of coke. Indian coals, distillation of wood and production of charcoal with special reference to India.

Minor solid fuels:—Bagasse, spent tan, Nile Stud, Straw, paddy husk, cocoanut fibre, etc., pulverized fuel plant, general layout of the plant and its working. Burners for above.

Liquid fuels:—A general survey of the countries from which liquid fuel is obtained. The economic aspect of liquid fuel.

Petroleum, shale oil, tar and tar oils. General characteristics and distillates obtained from above. Physical characteristics, chemical composition, calorific value and fuel consumption. Standard laboratory tests. Power alcohol and synthetic fuel.

Liquid fuels for steam raising purposes; general arrangement of air, steam and pressure systems. Relative efficiencies; burners for above.

Gaseous fuels:—Natural gas, oil gas, town gas, coke oven gas and blast furnace gas. Physical characteristics, chemical composition, calorific value and fuel consumption. General ideas about the preparation of the gas. Suction gas plant. General layout and working for bituminous and non-bituminous fuels.

Problems and calorific value and combustion.

(22) MACHINE TOOLS AND WORKSHOP PRACTICE.

Smithy:—Blacksmith tools; fullers, swages, tongs, etc Arrangement of fires, pressure fans for blast. Suction fans and prevention of smoke. Swaging, fullering, upsetting and welding. Examples of light and heavy forging. Power Hammers. Steam, pneumatic and drop hammer. Examples of drop forging and mass production.

Iron Foundry:—

(*a*) *Pattern Making*:—Principles underlying the making of patterns and core-boxes. Metal patterns for mass production.

(*b*) *Moulding*:—Moulder's tools: trowels, cleaners, etc., Examples of moulding machine parts.

(*c*) *Core Making*:—Various methods of making cores. Special cores for pipes and cylinders.

(*d*) *Moulding Sand*:—Selection and preparation of moulding sand. Grades of moulding sand. Green and dry sand moulding. Simple examples.

(*e*) *Cupola*:—Dimension, lining, method of starting, charging and drawing of the metal. Preparation of the mould for casting. Casting.

Brass Foundry:—Moulds for brass and bronze machine parts. Crucibles, ordinary and tilting. Melting, mixing and casting. Die casting and mass production.

Moulding Machines:—Pressure, tilting, vibrator and centrifugal moulding machines.

Mettallurgy:—Definitions and explanations of terms used in Metallurgy. Metals of importance to the engineer. Elementary Metallurgy, Cast Iron, Wrought Iron, Mild Steel, Carbon and alloy steel. Method of manufacture and heat treatment. Malleable casting.

Normalizing, annealing, hardening, tempering, case hardening and nitriding.

Useful alloys of copper and aluminium.

The use of Zinc, Tin, Lead, Nickel, Manganese, Chromium, Tungsten, Vanadium, etc.

Fitting Shop:—Fitter's tools; hammer, chisel, file, scraper, stock and dies, etc. Marking table and accessories. Marking out work. Chipping, filing and scraping. Examples.

Limits, tolerance and allowance Newalls and B. S. Specifications. Classification of work. Interchangeability of parts and mass production.

Lathes:—Specifications, parts and description, Classification: bench, engineer's heavy duty and special lathes. Modern improvements. Automatic feeds. Jigs, tools and accessories. Examples of screw cutting and other work.

Capstan and turret lathes. Mass production.

Shaping Machine:—Specifications, parts and description. Modern improvements. Automatic feeds. Jigs, tools and accessories. Examples of work.

Planing Machine:—Specification, parts and description. Modern improvements. Automatic feeds, Jigs, tools and accessories. Drive; gear, belt, electric and epicyclic train. Examples of work.

Drilling Machine:—Fixed spindle, radial and universal. Specifications, parts and description. Modern improvements. Automatic feeds. Jigs, drill and accessories. Examples of work. Gang drills.

Milling Machine:—Vertical, horizontal and universal. Specification, parts and description. Jigs, tools and accessories. Examples of work. Milling surfaces, slotting, keyway cutting, slitting and straddle milling. Machining, bevel gears, worm gears, spur gears, helical gears and cams.

Gear Shaping Machine:—Specifications, parts and description. Modern improvements. Automatic feeds. Jigs, tools and accessories. Machining spur, worm, bevel and Helical gears, Rack cutters and hobs.

Grinding Machine:—Horizontal and vertical. Surface, cylindrical and internal grinding. Specification, parts and description. Modern improvements. Automatic feeds.

Grinding Wheel. Grit, grade and manufacture, peripheral speed, side feed and depth of cut. Accuracy and finish of work. Examples of work.

Boring Machine:—Horizontal and vertical. Specification, parts and description. Modern improvements. Jigs, tools and accessories. Examples of work.

Tool room:—The necessity of a tool room in a workshop. Mass production of standard tools. Carbon, high carbon, high speed. Widia and diamond tools. Heat treatment; hardening, tempering and

annealing. Furnaces, pyrometers and charts. Salt Baths, quenching baths and air blast. Grinding and sharpening of tools. Emery grinders, twist drill grinders. Milling cutter grinders and Lumsden oscillating tool grinder.

Measuring instruments:—Whitworth measuring machine, Micrometer and Vernier callipers, internal micrometer, two point, three point and four point. Gear tooth vernier.

(23) MACHINE DRAWING AND DESIGN.

The students will prepare assembly and detailed drawing of the following from their own sketches. They will submit the sketches in a standard sketch book along with their drawings.

(1) Steam engine cylinder piston and valves.

(2) Internal combustion engine cylinder, piston, valves and valve mechanism.

(3) A 4-speed gear box for an automobile engine.

(4) Single plate dry clutch for an automobile.

(5) Lathe, fast and loose head stock.

(6) A scroll chuck for a lathe.

(7) An oil burner for a boiler.

(8) Foundation for an electric motor, an oil engine and a pneumatic hammer. One of the drawings will be inked, traced and a ferro print taken.

The students will design and prepare working drawings of the following:—

(1) A single cylinder steam engine.

(2) A high speed Diesel engine.

(3) A 4-speed gear box for an automobile engine.

(4) A 6″ centrifugal pump.

(5) A Pelton wheel.

(6) A Francis or a Kaplan turbine.

(7) A Vertical, locomotive or a Lancashire boiler.

Book recommended:—

Intermediate Drawing by Parkinson.

(24) ENGINEERING ECONOMICS.

Economics:—

Business organisation, advertising, insurance, costs and cost keeping—Materials—Direct and Indirect charges—Depreciation and Valuation.

Labour and wages, methods of paying wages. Bonus and profit sharing systems—Trade Unions and lock-outs.

Stores and stores management.

Book-keeping:—

Cash Book, Purchase Book, Sales Book. The Ledger, Double Entry, Balance Sheet.

Specification:—

Specifications of some important construction work, boiler work, structural work and castings. Standard forms of contracts.

Estimating:—

Estimating cost of simple machines, steel framed structures, elevated tanks, cost of shops with shafting, counter-shafting, belting, pulleys, etc.

Law:—

Industrial Legislation—Workmen's Compensation Act—Prevention and settlement of disputes—Unemployment, Insurance—Health Insurance.

(25) HEAT ENGINES I.

Thermodynamics:—Units of heat. Heating and expansion of gases. Internal energy of a gas. Laws of perfect gases. Air cycles. Carnot's, Otto, Diesel and dual combustion cycles. Entropy of gases. Internal Combustion Engines :—Gas and Petrol Engines, Oil Engines, Diesel and semi-Diesel Engines. Working and features of two and four stroke cycles. Efficiencies and engine tests.

Air Compressors:—Single and multi-stage compressors. Inter-cooling, conditions for maximum efficiency.

Refrigeration:—General principles, types of mechanical refrigerators, vapour compression refrigerators. Co-efficients of performance. Choice of vapours for commercial refrigerators.

(26) THEORY AND CALCULATION OF ELECTRICAL APPARATUS I.

D.C. Generators :—Calculation of induced E. M. F. Armature windings. Armature reaction. Commutation. Inter-poles. Methods of excitation. Characteristics of shunt, series and compound wound generators. Losses, efficiency and temperature rise. Parallel operation with and without batteries. Tirril regulator. Rosenberg, three-brush and arc-welding generators. Balancers and boosters.

D.C. Motors:—Calculation of torque. Back E.M.F. induced in motor armature. Load characteristics of shunt, series, and compound motors. Swinburne's test. Testing pairs of similar series and shunt motors.

Acid and Alkaline Batteries:—Installation and first charge. Charging equipment. Milking booster. Capacity and efficiency tests. Care and maintenance.

A.C. Circuits:—Solution of series, parallel and series parallel circuits. Current and voltage resonance. Locus of current in series circuits.

Single Phase Transformers:—Theory of operation. Mutual and leakage fluxes. Expression for voltages induced in primary and secondary. Types and construction. Vector diagram. Equivalent circuit. Determination of constants in equivalent circuit by open-circuit and short circuit tests. Predetermination of performance. Kapp's diagram. All-day efficiency. Temperature rise and methods of cooling. Sumpner's test for determining efficiency and temperature rise. Parallel operation. Auto-transformers; comparison with double wound transformers. Instrument transformers.

Polyphase currents and circuits.

Polyphase Transformers.—Types and construction. Three phase connections. Third harmonic in phase voltage. Tertiary winding. Auto-transformer. Transformation from three phase to single phase, two phase, six phase and twelve phase. Paralleling and parallel operation. No-load and on-load top changing. Induction and moving coil voltage regulators.

(27) DESIGN AND DRAWING I.

D. C. Machines:—Magnetic and specific electric loading. Output co-efficient. Effect of number of poles on general design. Ratio of pole-arc to pole-pitch. Determination of the main dimensions. Mean E.M.F. induced per conductor. Number of conductors. Number of

slots. Design of slot. Winding diagram. Final dimensions of core-length. Design of poles, yoke, airgap. Field windings. Inter-poles. Commutator. Brushes. Armature reaction Regulation and series winding. Calculation of the open-circuit characteristic.

Transformers:—Output. Specific loadings. Design of core-section and number of turns. Coils and insulation. Reinforced coils. Magnetising current. Cooling. Losses. Calculation of efficiency and regulation.

(28) HEAT ENGINES II.

Properties of Steam, wet, dry and superheated; internal energy of steam. Use of steam tables. Carnot's cycle with steam as working agent. Entropy of steam. Temperature entropy diagram. Total heat entropy diagrams. Expansion of steam, Rankine cycle applied to steam and modifications. The indicator diagram, hypothetical and actual. Theory of steam engines. Unaflow, simple and multiple expansion engines. Actual performance of steam engines. Losses and methods of reducing them. Efficiencies in practice. Engine trials. Heat balance sheet, variation of steam consumption with H.P., governing.

Steam nozzles:—Flow of steam through nozzles. Velocity of expanding steam. Nozzle form and general relations for frictionless adiabatic flow. Effect of friction. Supersaturated flow.

Turbines:—Impulse and reaction pairs, work done by a pair. Velocity diagram for moving blades. Blade friction. The DeLaval Turbine. Impulse turbine with several blade rings Velocity diagram for axial discharge. Compounding for pressure and velocity. Parson's reaction turbine. Velocity diagrams. Height of blades in reaction turbines. Increasing output and efficiency of turbines by reheating and bleeding of steam.

(29) ELECTRICAL THEORY AND MEASUREMENTS.

Electrical Units and Standards. Relation between C. G. S. and the practical electrostatic and electromagnetic units. Standard Cells. Standards of luminous flux, Candle Power and illumination. Self and mutual inductance; capacitance self and external.

Alternating Current Theory:—Symbolic vector methods and "Complex" quantities and their application to practical cases *i.e.* polyphase circuits and alternating current networks. Inversion and application to simple circuits. Hormonics in single and polyphase

circuits. Properties of rotating fields. Simple cases of transient phenomenon.

Methods of Electrical Measurements:—Theory and practice of modern test methods for the measurement of electric and magnetic quantities. Ballistic tests; flux meters. Continuous and alternating current potentiometers. Watt meter measurements. Direct current bridges; the Wheatstone, the Carey, Foster and the Kelvin bridge. Measurement of high and low resistance. Alternating current bridge measurements of effective resistance and reactance; the Schering bridge and the Heaviside Campbell bridge. Frequency measurement. Oscillographs for high and low frequencies. Measurement of magnetic properties of iron. Iron loss measurements by Watt meter; Epstein tester. Measurement of dielectric properties. Measurement of luminous flux, candle power, illumination. High Voltage testing.

Electrical Measuring Instruments:—Moving Coil, moving iron, electrostatic, thermal, dynamometer and induction types. Energy meters. Ohm meters. Megger. Frequency meters. Power Factor Meter. Reactive current ammeter and synchroscope. Maximum demand indicator. Electrical pyrometers.

(30) THEORY AND CALCULATION OF ELECTRICAL APPARATUS II.

Alternator:—Types and construction. Methods of producing sinusoidal voltage. Single and polyphase armature windings. Expression for induced voltage. Star and delta connections. Harmonics. Advantages of Star connection. Rotating flux of polyphase armature. Armature reaction. Leakage flux. Load characteristics. Behn-Eschenberg's. Rotherts' and Potier's theories. Predetermination of regulation. Synchronising and synchronoscopes. Synchronising torque. Parallel operation.

Synchronous Motor:—Theory of operation. Vector diagram, current locus and characteristics at constant excitation and applied voltage. Stability. Predetermination of performance. Variation of current power factor, efficiency and pull-out torque with excitation. Synchronous condenser. Hunting and its prevention. Methods of starting.

Single Phase Commutator Motors:—Theory of operation, construction, vector diagram and characteristics of uncompensated and compensated series motors. Shunt and series commutating poles. Methods of starting. Comparsion of A.C. and D.C. series motors.

Theory of operation, construction, and characteristics of uncompensated and compensated repulsion motors.

Polyphase Induction Motors:—Theory of operation and construction of squirrel cage and slip-ring types. Vector diagram. Equivalent circuit. Expression for torque. Starting torque. Maximum torque. Slip-torque characteristics. Starters. Load characteristics. Circle diagram. Predetermination of performance. Induction generator. Theory of opertion and characteristics of double squirrel cage motor. Speed control by resistance in secondary, pole changing and cascading. Theory of operation and characteristics of phase advancers, Osnos motor, polyphase capacitor motor and Schrage motor.

Single Phase Induction Motors:—Resolution of single phase flux into two rotating fluxes. Operation. Theory of operation, characteristics and starting of polyphase induction motor on single phase. Phase converter. Theory of operation and characteristics of split phase, capacitor and repulsion-start iduction motors and repulsion-induction motor.

Rotary Converters:—Synchronous converter. Theory of operation. Voltage and current ratios. Wave form of current in various coils. Armature copper loss. Efficiency. Armature reaction and commutation. Comparison with D.C. Generator. Theory of operation, starting and characteristics of motor-converter. Power transformed mechanically and electrically.

Rectifiers:—Mercury arc rectifier. Theory of operation. Transformer connections. Characteristics. Interphase transformer. Current and voltage ratios and wave forms. Protection and voltage control by grid bias. Theory of operation and characteristics of copper oxide and hot cathode rectifiers.

(31) GENERATION AND UTILIZATION.

GENERATION.

Fixed costs and working costs of generation. Straight line and sinking fund methods of depreciation. Maximum demand, load factor, diversity factor and their influence on the cost of generation. Systems of tariffs. Choice of site of station. Choice of prime movers and number and size of units. Combined steam and hydro-plants. Interconnected stations.

Cooling systems for generators. Protection against fire. Objects and methods of earthing the neutral. Protection relays. Excitation

systems. Voltage control. Switch gear. Short-circuiting of generators. Current limiting reactors.

Utilization.

Electric Drive:—Comparison of electrical and mechanical drives. Individual, group and semi-group drives. Costs and characteristics of various types of A.C. and D.C. constant and variable speed motors and their industrial applications. Economic choice of motor. Choice between generating power in factory and purchasing from Electric Supply Company

Electric Traction:—Direct current, single phase and three phase systems. Motor characteristics. Sub-stations. Line and track construction. Current collection. Manual and automatic controllers. Locomotive, motor coach and multiple unit trains. Diesel-electric traction. Mechanics of train movement. Energy and speed-time calculations.

Illumination:—Filament and gaseous discharge lamps and their characteristics. Shades and reflectors. Design of factory lighting and interior illumination of buildings. Parallel and series system of street lighting.

(32) TRANSMISSION AND DISTRIBUTION.

Transmission system. Electrical and Mechanical properties of conductors. Corona Construction of high voltage underground cables. Potential stress losses and faults in cables. Types and construction of insulators. Voltage distribution in a string of suspension insulators. Grading rings. Arcing horns. Insulator testing. Porcelain, oil-filled and condenser bushings. Performance of short and long lines. Voltage regulation. Power circle diagrams of constant voltage lines. System stability. Isolated and grounded systems. Arcing ground and Peterson coil. Calculation of short circuits in transmission lines. Circuit breakers and protective relays. Travelling waves. Lighting arrestors. Transposition of lines.

Loading and strength requirements of conductors. Sags and stress in conductors with supports at same level. Effect of temperature variation. Sags and stress in conductors with supports at different levels. The Thomas chart and its use for sag and stress determinations. Design and calculations for wooden poles, steel poles, steel towers, guys, struts and cross arms.

Comparison of D. C two wire and three wire, A.C. single phase, two phase and three phase systems of distribution Primary and secondary distribution. Calculation of voltage drop in conductors for concentrated and distributed loads.

(33) DESIGN, ESTIMATE AND DRAWING OF ELECTRIC SUPPLY SYSTEMS.

Design of Distributors, poles and structures. Location and design of sub-stations. Design of Transmission lines and structures. Design and lay-out of A.C. and D.C. generating stations. Provisions of the Indian Electricity Act. Complete design and estimation of a town electrification scheme.

(34) DESIGN AND DRAWING II.

Alternators:—Low speed, Medium speed and Turbo-alternators. Output co-efficient. Main dimensions. Stator winding. Design of slot. Design of field system. Essential features in construction of the stators and rotors.

Induction Motor:—Calculation of the main dimensions. Stator winding. Rotor slip ring and squirrel cage. Magnetising current. Efficiency.

(35) ENGINEERING ELECTRONICS I.

The electron and its properties, gaseous conduction, arc and glow discharges. Thermionic emission; types of emitters; space charge. Characteristics of the diode, triode, tetrode and pentode; their applications; distortion, output and efficiency.

(36) ENGINEERING ELECTRONICS II.

Vacuum tube oscillators; typical circuits; frequency stability and the use of quartz crystals, etc. Cathode ray tubes and their simple applications.

(37) HIGH FREQUENCY MEASUREMENTS.

Sources of supply, standards and auxiliary apparatus; measurements of current, voltage and frequency; wave meters and frequency standards. Measurements of circuit constant; resistance, inductance, capacitance and mutual inductance. Antennæ and feeder measuremants; field strength measurements.

(38) TRANSMISSION CIRCUITS.

Elements of Circuit Theory:—Linear circuit analysis with lumped constants; transient and steady states; forced and free

oscillations; resonance, selectivity and decrement: coupled circuits; applications in audio and radio frequency engineering; non-linear systems.

Networks and Filters:—Network theorems; superposition, artificial lines, attenuators, equalisers and wave-filters. Four terminal networks; image and iterative parameters: termination, loss and reflection. Transmission line equivalents.

(39) BROADCASTING—I (RECEPTION).

Problems of reception; signals; fading and distortion. Receiver-requirements; types of receivers and their behaviour; automatic gain control, selectivity, tone control, automatic frequency control, push button tuning and volume expansion; power supplies. Special receivers such as for (*a*) Television, (*b*) diversity and (*c*) single side band reception. Receiving antennas. Testing and repairing receivers.

(40) BROADCASTING II—(TRANSMISSION).

Wave propagation; attenuation and coverage; echoes, fading, skip distance, etc; indirect ray and its behaviour; atmospheric and man made disturbances. Transmission standards. Optimum frequency and power considerations.

General requirements of transmitters, different types of power supplies and their relative merits. Typical circuits of low, medium and high power transmitters.

Methods of modulation, types of signals, low and high modulation, carrier and single side band suppression, frequency and phase modulation.

Antenna systems, directional antennas, antenna arrays and mast radiators; current and voltage distribution. Typical installations. Feeders; simple theory of surge impedance, matching, etc.

Studio acoustics, speech and hearing, noise levels, reverberation and their optimum for studios, acoustic materials and their uses; typical installations.

(41) WIRE COMMUNICATION I—(TELEGRAPHY).

Conductors used for local, short and long distance working poles, cross arms and insulators. Manual working, instruments, keys, sounders, relays, etc. Single and double current systems; quadruplex circuits; central battery working, long distance working repeaters and loading. High speed automatic working. Single

and multiple channels, Wheatstone automatic, simplex and duplex. Baudot transmitting, repeating and receiving apparatus. Teleprinter.

(42) WIRE COMMUNICATION II—(TELEPHONY).

Speeech and hearing, requirements of commercial communication. Decibel and neper notations. Electro-acoustical instruments. Telephone lines and cables. Transmission theory, attenuation and propagation constants, characteristic impedance, conditions for distortionless transmission, cross talk. Manual, Magneto, CBX and CB systems. Subscribers and exchange apparatus. Automatic telephony. Single and multi-office working; long distance working, loading, repeaters and equalisers and echo suppression. Transposition arrangements.

(43) BRIDGE ENGINEERING.

1. *General.*—Choice of type and site of bridges; aesthetics in design, design of piers, abutments, retaining walls, culverts, masonry arched bridges, Irish bridges, submersible bridges and pipe culverts; design of waterway, run-off and catchment.

2. *Foundations.*—Soil pressures, cofferdams, caissons, pneumatic caissons, wells, piles; grouting and freezing processes.

3. *Loads.*—Dead and live loads, uplift, impact, centrifugal fcrce, wind load, Indian Roads. Congress Regulations.

4. *Superstructure Materials.*—Steel, R.C., alloy steel and timber.

5. *Design of Superstructure.*—(*a*) Steel bridges—plate girder. N. type girder, bowstring girder, Warran girder; suspension bridges and steel arches.

   (*b*) *Reinforced Concrete Bridges.*—Deek type, arch, arch ribs, bowstring; prestrening; vibrated concrete.

   (*c*) *Timber Bridges.*—Details of design.

6. *Erection and Falsework.*—Erection by floatation, by falsework, cantilevering, gallows frames, derick car, locomotive crane, ordinary falsework.

7. *Deflections.*

8. Economics of bridge design, first cost, maintenance costs; utility.

9. Ethics of bridge engineering.

(44) DRAWING AND DESIGN.

Design, preparation of working drawings and making estimates of materials and tools of culverts, causeways; steel and reinforced concrete bridges.

(45) GEOLOGY.

Rock forming minerals.—General physical properties.

Rocks.—Their general character, mode of formation, occurrence and origin; structural features and metamorphism of rocks.

Rock weathering and soils—Stability of slopes.—Land slides affecting cuttings.

Road Foundation.—Kinds of rock, rock structure, valley crossings.

Materials used for road construction.—Clay, sand, broken stone, gravel and fillers. Asphalt and bituminous rocks—their characteristics, origin, structure, composition and properties.

Weathering, quarrying and testing of stones. Classification of road stones, their minerological constitution. Petrology in relation to quality of road making stones.

The texture, porosity and structure of rocks affecting tunnelling and sinking of shafts.

Practical:—1. Identification of most important rocks with the aid of a simple lens and microscope.

2. Interpretation of simple Geological maps.

CHEMISTRY.

1. *Portland Cement.*—Special cements, their manufacture, treatment and properties; water proofing. Theory of setting of cement.
2. *Tars, Bitumen, Asphalts and Road Oils.*—Origin, chemical composition and treatment. The effects of the different constituents on their properties.
3. *Bituminous mixtures.*—Fillers and mixed materials; emulsions—physical chemistry and their characteristics.

(46) SURVEYING.

1. *Theodolite.*—Uses and adjustments, different types; errors.
2. *Traverse Survey.*—Measurement of angles by repetition, Gale's Method of plotting by co-ordinates, distribution of error.

3. *Setting out.*—Simple, compound, vertical and transition curves; curve tables; setting out and measuring engineering works.

4. *Triangulation.*—Minor triangulation, choice of stations, triangles, quadrilaterals, interlaced polygons; signals, erection, heliotrope, field observations, angles by reiteration, vertical angles for heights; satellite stations, 3 point problem, intersected points.

5. *Base line measurement.*—Correction and reduction of measurements, adjustment of angles by the method of equal shifts, least squares, calculation of co-ordinates, plotting, precise levelling and problems in heights and distances.

6. *Tacheometric Surveying and Subtense measurements.*—Principles of stadia, formulæ, field observations, staves, subtense bar, field work, reduction by diagrams, tables, slide rule, plotting by tacheometric protractor.

7. *Use and adjustments of.*—Engineer's Improved Level, Zeis's Level, direct reading tacheometers, mining dial and telescopic alidade and plane table equipment.

8. *Cross Sectioning by American Method.*—Diagram for setting out slope stakes, stadia traveres, contours. Earthwork computations.

9. *Reconnaissance Survey and Reports.*—Examples of estimating costs of roads, openings in roads. Different class road surveys, setting out rough road curves, field organisation of survey parties, preparation of estimates and staking out lines.

10. *Tunnels.*—General considerations, surface alignment, curves in tunnels, setting out tunnels, transferring the lines and levels underground, underground bench marks, errors.

11. *Photographic Survey.*—Photographic surveying; principles of aerial surveying and air survey for road reconnaissance.

12. *Hydrographic Surveying.*—Soundings, cross section of streams and rivers; tides.

(47) HIGHWAY ENGINEERING I.

1. *Purpose and History of Roads and their needs.*—Roads in ancient India and other countries, ancient, 18th century and modern roads. History of the vehicle and its relation to road development.

2. *Classification and planning of Highways.*
3. *Road Problems.*—Safety, road accidents, speed, vision, road junctions, effect of colour, slipperiness, tractive resistance, corrugations, wear and resistance to climate, noise and vibration.
4. *Economics of Highway Engineering.*—Financial sources of funds, possibilities of future revenue and taxation; road costs:—capital cost, road loans; annual cost—capital charges and maintenance; cost of transportation, vehicle running costs, running costs as affected by the road.
5. *Ideals of Route Location.*—Traffic surveys, influence of topography and geology.
6. *Preparation of Schemes.*—Surveys and drawings, reconnaissance, preliminary and location surveys, acquisition of land, preparing working drawings.
7. *Design of carriageway.*—Camber: gradients, super-elevation, method of application, design and improvement of hill roads, traffic census and its relation to road widths and surfaces.

(48) HIGHWAY ENGINEERING II.

1. *Construction and materials.*—Sub-soil; drainage foundations; sources, selection and testing of materials of construction: construction of various surfaces, W. B. Macadam, tar, bituminous and concrete surfaces; stone set, wood block and brick pavements; foot paths, Kerbs and channelling.
2. *Soil stabilization and Soil Mechanics.*
3. *Road making machinery.*—Road graders, rollers. scarifiers, tar and bitumen boilers and spraying machines, emulsion plant, portable premix plant, hot-mix plant, dragspreaders, concrete mixers, mechanical tampers, pneumatic road drills, stone crushers.
4. *Maintenance.*—Factors affecting surface deterioration, corrugations, measurements of wear, maintenance and cleaning.
5. *Operation.*—Road traffic, signalling, control and regulation, lighting, parking facilities, bus halts and shelters on highway.
6. *Organisation and Administration.*—Contract conditions, labour, haulage, method of storekeeping, highway accounts, preparation of plans and reports, technical supervision, general administration acts, orders and bye-laws.

Laboratory Work:

Tests on stones.—Abrasion, attrition, crushing strength, impact, absorption, cemenation and adhesion. Vaid test; sieving and grading analysis of sand.

Test on Tar, Bitumens and Emulsions.—Viscosity penetration, ductility, melting point, loss on heating, flash and fire points.

Practical.—(i) The candidate may be asked questions upon any subject within the scope of any part of the written examination.

(ii) He will be shown an assortment of materials and tools used in highway construction and will be required to identify them.

(iii) He may be asked to conduct any test on any road materials in the Laboratory.

(49) DESIGN AND DRAWING.

Designing and preparing working drawings of (*a*) road junctions. (*b*) schemes of traffic regulation, (*c*) new roads or improvements of old roads.

Drawing of specifications and preparation of estimates and bill of quantities for the above.

Project.—Students will carry out a complete project of a short length of a highway which will include surveys, setting out, selection and arrangement of plant, and the preparation of the working drawings and bill of quantities. The project work will be of about one month's duration.

Ground Tracing.—Setting out roads in cuttings and embankments, culverts and bridges.

Practical.—(*a*) The candidate will be asked questions on the project report and drawings submitted by him.

(*b*) He may be asked to set out on the ground any one of the items mentioned in the syllabus.

(50) APPLIED MECHANICS III AND SIMPLE THEORY OF FLIGHT.

(A) Dynamics of a rigid body, D'Alembert's principle, governors, flexural vibrations, torsional vibrations, coriolis force and relative motion, gyroscopic motion and its application in engineering, impact of rigid bodies, simple vector analysis, use of vectors in mechanics.

(B) Forces on an airfoil, take off, climb, glide turning, other air manouevres, glide and dive, landing. Functions of control parts, general ideas of stability of airplanes aeronautical nomenclature.

(51) AIRPLANE STRUCTURES.

Nomenclature of airplane parts, primary and secondary structures, spars, ribs, trusses, lift and drag systems, control parts; wing cellule, fuselage, engine mounts, landing gear, floats and hulls, loads coming on different parts and application of theory of structures to design of these parts.

(52) AIRCRAFT ENGINES AND CONTROL SYSTEMS.

Thermodynamics—properties of gases, thermodynamic cycles, internal energy, efficiency and losses in actual engines, thermal efficiency, indicator diagrams, I.H.P. volumetric efficiency, combustion processes.

Petrol Engine Performance:

Aircraft Engine Fuels.—Properties of fuels, constituents used for antiknock, practical aspects, octane rating of fuels, engine weight and octane number, cetane number of compression ignition engines.

Carburettors.—Principles, actual methods used, effect of altitude and altitude control, fuel consumption, automatic throttle control, carburettor take off requirements, aircraft carburettor details, supercharging, efficiency of supercharging, types of superchargers.

Cooling of engines.—Coolents used, air cooling, aerodynamic considerations in cooling, radiator types and location.

Altitude effect on engine power.

Principles of Hydraulic control mechanism, pumps, valves, reservoirs, flap and landing gear operation, propeller pitch changing mechanism, breaks, shock absorbers, Electrical control of flaps, landing gears, propellers, Hydraulic system, automatic gyropilots, remote control instruments, starters and generators, raido equipment, batteries and heating equipment.

(53) FLUID MECHANICS.

Equations of fluid motion, potential flow, circulation and vortices, application to airfoils and other bodies, sources and sinks, conformal transformation. Equation of motion of viscous fluids, boundary layer, viscous drag and dynamical similarity, turbulence, flow of compressible fluids and experimental methods

(54) TECHNICAL AERODYNAMICS.

Aerofoil characteristics, wind tunnel data, parasite drag, complete wing, dynamics of complete airplane, control surfaces, static and dynamic stability, engine and propeller characteristics, performance calculations, spcial flight problems, airplane design (aerodynamics) in general, sea planes, hull and float characteristics.

(55) AIR NAVIGATION.

Aviation maps and charts, magnetic compass, ether compasses, dead reckoning, dead reckoning instruments (compass, driftsight, wind gauge, bearing plate, altimeter, airspeed indicator, fore and aft level, turn and bank indicator, barograph, rate of climb indicator, automatic air log) radio in navigation, theory of celestial navigation.

(56) METEOROLGY.

Atmosphere, pressure and its changes, temperature, wind direction and velocity cloud forms, cloudiness, ceiling, weather, visibility, state of ground, weather maps, weather code.

(57) AIRPLANE DESIGN.

Preliminary.—Specifications, preliminary layout calculations, load factors and other requirements, wing and control surface areas, propeller selection, balance diagram and location of C. G. preliminary stability calculations, weight estimation, improved layout and performance estimation.

Detailed.—Type of construction of parts, wing, fuselage, landing gear, hull, float, control parts design, control system, seats and auxiliary equipment, airworthiness requirements for design of parts and materials to be used, standard parts, A. N. Standards, aircraft drafting practice, detailed drawings of parts and assemblies, installation drawings.

(58) AIRCRAFT STRESS—ANALYSIS.

Strength requirements, wing, fuselage, tail surfaces, landing gear, hull and float analysis, margins of safety.

(Analysers must use approved methods and give details such as important dimensions and sketches where necessary of all parts in an assembly and write the analysis in an approved form and show that positive margins of safety are available in each case.)

(59) DESIGN PRACTICE.

Types of spars and their uses, types of wings and fuselages, details of control surface constructions, wooden and metal constructions, fabrication methods, jigs and fixtures, assembly methods, propeller inspection and small repairs, overhaul and inspection of aircraft structures, proof of structural strength, static loading, deflection records and interpretation of results.

(60) PRODUCTION PLANNING.

Factory organisation, work orders, engineering changes, productive and non-productive stores, follow up of parts and assemblies, schedules of work, costing and accounting, time-keeping and methods of speeding production.

Automotive Engineering.

(61) AUTOMOTIVE ENGINES—I.

Petrol engine. Theory. Fuel Technology. Petrol and other alternative fuels. The phenomena of combustion. Flame propagation, detonation and pre-ignition. High octane fuel. Doped fuels. Combustion chamber forms. Location of valves and sparking plugs. Efficiency, speed, power output and rating. Four stroke, poppet, sleeve and rotary valve engines. Two stroke single port and three port engines. Normal aspiration and altitude effects. Principles of supercharging. Single and multicylinder engines. Firing order and crank arrangements. Suspension and mounting.

Engine Details. Cylinder head, cylinder block, crank case, oil pan, piston connecting rod, gudgeon pin, crank shaft, fly wheel, timing gear and cam shaft, valves and valve actuation.

Engine accessories. Superchargers, petrol, oil and water pumps, Filters, gauges, etc. Clutches, wet and dry: cone clutches. Gear boxes, sliding, constant mesh, synchro mesh, epicyclic and preselective gears. Gear actuation. Friction gears and gearless transmission.

Carburettors and fuel feed. Theory of carburation and principles of compensation. Manifolds and factors affecting distribution. Dual manifolds; air heating and exhaust jacketing. General consideration and functional principles of main, compensating, pilot and power jets; accelerating pumps. Operation and working.

Types of carburettors. Throttles and Controls. Carburettor tuning. Petrol feed; Gravity, vacuum, pump and electric lifts. Petrol tanks; main and auxiliary; location and mounting.

Ignition. Definitions and basic theory. The induction coil, cams, contact breakers, condensers and distributors. Drive for the ignition unit for single and multi cylinder engines. Starting swich. Timing; Automatic and hand control for advance and retard. Wiring diagram. The High Tension Magneto. Rotating and polar inductor types; drive, cam, contact breaker and distributor for single and multi cylinder engines. Starting switch. Timing. Advance and retard. Wiring diagram. H.T. leads and sparking plugs.

Battery. Basic theory. Lead acid and nickel iron. Construction. First charge, repair and maintenance.

Cooling and lubrication systems. Air, Water, steam and oil cooling. Anti Freeze mixtures. Radiator construction. Honey comb, corrugated strip and gilded tube. Thermo syphon and pump circulation. Thermostats and temperature control. Lubrication; splash, low pressure and high pressure systems. The oil sump and dry sump methods. Oil filters and coolers. Specifications for lubricating oils. Lubricating oil under running conditions. Lubrication diagram.

(62) AUTOMOTIVE ENGINEERING DESIGN PRACTICE.

Constructional details and specialist design of combustion chamber, cylinder and cylinder liner. Piston and piston rings; Connecting rod and gudgeon pin. Bearings and Crank shaft. The Lancaster anti-vibrator. Torque reaction and offset cylinder. Fly wheels: Cams and valves. Carburettors, clutches and gear box.

(63) AUTOMOTIVE ENGINEERING—II.

High speed compression ignition engine. Comparison of the H.S., C.I. and petrol engines. Advantages and disadvantages of the two types; relative costs, etc. Fuel technology. H.S.D. oil and other alternative fuels. The phenomena of combustion, flame, propagation, detonation and pre-ignition. Cetane rating; doped fuels. Combustion chamber forms. Location of valves and atomisers. Efficiency, speed, power output and rating. Four stroke; poppet, sleeve and rotary valve engines. Two stroke engines. Normal aspiration and altitude effects. Principles of super charging. Single and multi cylinder engines. Firing order and crank arrangements. Suspension and mounting.

Fuel pumps and fuel injection systems. Fuel pumps; types for single and multi cylinder engines. Fuel pump drive and couplings. Injection advance. Injection valves, nozzles, pipe lines, governors and controls. Fuel filters.

C.I. and petrol air craft engines. General aspects as compared with automobile engines. Types. Power required for flight equilibrium of air screw and engine. Altitude and power output. Supercharged engines for high altitudes. Gas turbines and Jet Engines.

(64) CHASSIS AND ITS COMPONENTS.

Classification of various vehicles. Power weight ratio. Chassis lay out and construction for various classes of vehicles. Position of gear box and gear lever. Quadrant and gate changes. Transmission systems and universal joints. Torque rods and torque tubes. Front axles, rear axles; fixed and floating. Rear wheel drive, Front wheel drive and four wheel drive. Bevel, worm, spiral and chain transmissions. Shock absorbers. Wheels; artillery, disc and wire wheels. Tyres, rims and accessories Principles of braking and braking mechanisms. Vacuum, servo and hydraulic braking systems. Steering, wheel alignment, toe-in, and Castor angle. Drop arm, actuation and linkage. Body and coach work; class, types and construction, seating capacity, Upholstery and painting.

(65) METALLURGY AND MATERIALS OF CONSTRUCTION AND SPECIFICATIONS.

Properties of pure metals and alloys. Methods of identification. Equilibrium diagrams of iron-carbon alloys. Materials used in the construction of automobile engines, chassis, body and tyres. Cast iron; grey, white, malleable and alloy. Cast Iron-Sand casting, chilled casting and centrifugal casting.

Carbon and alloy steels with special reference to nickel and nickel chrome steels, silichrome and austenitic heat resisting steels, silico manganese and chrome vanadium steels. Heat treatment and its effect on mechanical properties. Carbon case hardening and nitrarded steels, Brasses, bronzes, supro nickels and white metals. Problems of weight reduction. Light alloy of aluminium and magnesium with particular reference to Duralumin, Y alloy, R.R. alloys and Electron. Methods of working above steels and non-ferrous alloys.

Sheet metal work. Panelling, flanging, brazing, welding and soldering. Wood, bakelite, fabric, plastics and other materials

used for building bodies. Leather, rexine, cotton, canvas and rubber for upholstery and tops. Tinplating, galvanizing, electroplating, chromium plating, painting and enamelling for obtaining finish and protective coverings. Materials used for the construction of tyres. Rubber and canvas. Vulcanising.

(66) FUELS, GAS PLANT AND HEAT TRANSMISSION.

Fuels and Gas Plant.

Classification of fuels.—Proximate and ultimate analysis, Physical characteristics, chemical composition and calorific value. Suitability for steam raising and industrial purposes.

Solid fuels.—Peat, lignite, cannel, bituminous and anthracite varieties of coal. Production of coke. Indian coals, distillation of wood and production of charcoal with special reference to India.

Minor Solid Fuels.—Bagasse, spent tan, Nile Sud, straw, paddy husk, cocoanut fibre, etc., pulverized fuel plant, general layout of the plant and its working. Burners for above.

Liquid Fuels.—A general survey of the countries from which liquid fuel is obtained. The economic aspect of liquid fuel.

Petroleum, shale oil, tar and tar oils. General characteristics and distillates obtained from above. Physical characteristics, chemical composition, calorific value and fuel consumption. Standard laboratory tests. Power alcohol and synthetic fuel.

Liquid fuels for steam raising purposes; general arrangement of air, steam and pressure systems. Relative efficiencies ; burners for above.

Gaseous fuels.—Natural gas, oil gas, town gas, coke oven gas and blast furnace gas. Physical characteristics, chemical composition; calorific value and fuel consumption. General ideas about the preparation of the gas. Suction gas plant. General layout and working for bituminous and non-bituminous fuels.

Problems on calorific value and combustion.

Heat Transmission.

Heat transfer by conduction.—General equation for conduction—Steady state heat conduction—conduction through several bodies in series.

Heat transfer between fluids and solids.—Heating and cooling fluids by heat transfer through a solid wall; Thermal and Dynamic boundary layer. Film and overall transfer co-efficient—Streamline

and turbulent flows. Surface co-efficient of forced convection. Film conductance of fluids in pipes. Forced convection over outside surfaces.

Condensation of pure saturated vapour—effect of non-condensable gas—Cooling of a single superheated vapour—Heat transfer to boiling liquids—Submerged heating Surface—Scale deposits.

Radiation.—Radiation between the surfaces of solids separated by a non-absorbing medium—Heat transmission by radiation (gaseous), radiation from inactive gases. Radiation from luminous and non-luminous flames—Heat transfer in a combustion chamber.

(67) CHASSIS DESIGN PRACTICE.

Dynamics of a vehicle. Frames. Calculation of bending moment and stresses due to load and torque reactions. Gear box and engine supports. Transmission systems. H. P. transmitted, cardon shaft; open and torque tube types. Universal Joints. Bevel, worm, spiral and chain transmission. The differential. Rear axle; fixed and floating. Axle casing. Stresses due to load conditions and brake reactions. Wheels; side thrust on wheels and wheel slip.

Steering, Geometry of steering and approximations. Inclination and position of front wheels. Dynamics of single track vehicles. Conditions for auto stability.

Springing. Deflection and stresses in leaf and helical springs. Damping of springs. Design of shock absorbers. Forced vibration in springs.

Radiators. Types. Amount of heat to be dissipated. Surface required. Effect of speed. Tube size and density, etc.

Body and coach work. Factors affecting design and construction of body, corrosion, air resistance, anti squeak and strength.

Tyres. Factors affecting design and construction of tyres, tractive resistance, bearing capacity, wear, etc.

(68) ENGINEERING ECONOMICS AND MOTOR VEHICLES TRADE LAWS AND ACTS.

Engineering Economics.

Economics.—Business organization, advertising; insurance, costs and costs keeping. Materials—Direct and Indirect charges—Depreciation and Valuation.

Labour and wages, methods of paying wages. Bonus and profit sharing systems—Trade Unions lock-outs.

Stores and Stores management.

Book-keeping.—Cash Book, Purchase Book, Sales Book. The Ledger, Double Entry, Balance Sheet.

Specification.—Specifications of some important construction work, boiler work, structural work and castings. Standard forms of contracts.

Estimating.—Estimating cost of simple machines, steel framed structures, elevated tanks, cost of shops with shafting, counter-shafting-belting pulleys, etc.

Law.

Industrial legislation—Workmen's Compensation Act—Prevention and settlement of disputes—Unemployment, Insurance—Health Insurance.

Motor Vehicles Trade Laws and Acts.

Laws relating to the different types of commercial and private vehicles, taxation, insurances and contracts. Hire purchase transactions. Laws applicable to business in the motor industry. Methods of transacting business with manufacturing and wholesale firms. Sale and conditions regarding new and used vehicles. Valuation of second hand commercial vehicles and private cars. Rules governing car purchase, registration and par exchanges. Advertising.

(69) WORKSHOP PRACTICE—II.

Garage equipment. Hoists, lifts and jacks. Cylinder boring, grinding and lapping machines. Instruments for measuring cylinder bores, finish, etc. Connecting rod aligners, crankshaft turning and truing machines. Valve seat and face cutters. Jigs and tools for rebabbiting main bearings and big end bearings. Reamers for main bearings and big ends. Jigs and tools for gear box, differential, back axle and wheels. Samil tools and accessories.

Repair, reconditioning and overhaul, checking cylinder bore, reboring, fitting over size pistons and rings, checking crankshaft, renewing main bearings and big end, decarbonising, valve facing and grinding and refitting. Overhauling and repairing gear boxes and clutches. Overhauling and repairing front axle, steering

universal joints, propeller shafts, back axles, and brakes. Checking track of wheels, castor angle and toe in. Repairs to chassis, body, upholstery and top. Location of faults and minor repairs. Adjustments and timing. Road tests. Ignition, starting and lighting systems. Location of faults, overhaul and repairs. Rewiring. Carburettors; adjustment and tuning. Repairs to manifolds. Induction and exhaust pipe. Servicing and lubrication. Ordinary servicing, check up servicing, and specialized servicing.

(70) DESIGN AND DRAWING.

The students will design and prepare working drawings of Automotive engines, Chassis and Components based on the Syllabus for Automotive engine design practice and chassis design practice.

Textile Technology.

(13)-(*a*) GENERAL TEXTILE TECHNOLOGY.

Textile fibres.—Fibres used in the manufacture of yarn for weaving, structure of cotton, silk, wool, art silk, linen and bast fibres, determination of fibre length. Physical properties of fibres, their quality and determination. Significance of test results, moisture content of fibres. Effect of humidity on strength and elasticity.

Action of chemicals on textile fibres.—Action of Acids, Alkalies and Oxidising Agents, Salts, etc., on Textile Fibres. Water for Textile purposes.

Sequence of processes.—Processes used in the production of yarn and cloth from cotton, silk, wool, Rayon and Bast fibres. Operations of Bleaching, Dyeing, Finishing and Printing.

Cotton cultivation.—Geographical position of the cotton fields of the world. Area within which cotton can be commercially cultivated. Physical conditions necessary to its growth and their influence upon the character of the fibre with special reference to Indian conditions. General procedure of cultivating and harvesting of cotton. Time of sowing and picking of cotton. Damage to crops, cotton acreage and yield per acre. General characteristies of the chief varieties of cotton. Grading of cotton in relation to their values and spinning properties. Methods of selecting cotton when purchasing, the defects usually existing and their effect upon the value. Commercial purposes of mixing cotton.

Sericulture and silk reeling.—Mulberry cultivation, Silkworm Reparing and Silk Reeling and Silk Throwing.

Raising of wool.—Sheep breeding, wool shearing and sorting.

Textile testing.—System of numbering cotton, Worsted, Woollen, Silk, Rayon, Linen, Folded, Grandrelle and Fancy yarns and their conversions. Average and resultant yarn.

Stapling of fibres, Microscopical examination of fibres, testing of yarn for count, strength, elasticity, twist, regularity, moisture and cleanliness. Comparison of strength of threads as shown by lea, single thread and ballastic yarn tests. Testing of cloth. Identification of fibres. Estimation of cotton, wool and silk in yarn and fabric.

(71) TEXTILE TECHNOLOGY—II.

Elementary statistics. Analysis of test results by statistical methods. Preparing samples for testing and reasearch work. Construction and working of standard testing instruments for cotton, yarn and cloth.

Detailed consideration of the properties of cotton fibre and its reaction to various treatments. Relationship between fibre strength and yarn strength. Influence of twist, count and regularity on the physical properties of cotton yarn The theory of drafting by rollers. The influence of structure on the properties of cotton cloth. Quality in fibres, yarns and fabrics.

Recent researches and publications in Textile Technology.

(72) PREPARATION AND SPINNING—I.

Description and working of knife roller, Macarthy and Saw Gunning Machines, Hopper Bale Breakers, Hopper Feeders, Crighton Byckley, Porcupine, Exhaust, Youlten Openers; Pneumatic Conveyers, Dust Trunks, Scutchers, Flat and Shirley Carding Machines, Drawing Frames, Slubbing, Inter, Roving, and Jack Frames, Ring Spinning Machines, Doubling, Reeling, Bundling and Baling Machines.

Methods of clothing cards, stripping and grinding of cards and fillets. Roller covering. Principles and Drafting, setting of machine parts, calculations relating to gearing, speeds, production and efficiency of machines, power consumption, etc.

(73) PREPARATION AND WEAVING—I.

Description and working of Bobbin, Cheese Cone and Pira Winding machines. Beam warping, Slasher Sizing machine, Hot Air sizing machine.

Method of preparing size mixing, size mixing apparatus; Drawing in and Twisting.

Description and working of power looms with plain and twill motions; Healds and Reed Calculations. Calculations relating to gearing, speeds, production, power consumption and efficiency of machines.

(74) FABRIC STRUCTURE AND DESIGNING—I.

Plain weave and its modifications. Twill and derivatives including Satins. Diamond and kindred weaves, construction of Crapes, Spiders, and Grecians, Mock Lenos.

Elements and principles of ornaments. Influence of materials and structure upon ornament. Planning various types of ornament. Preparation of painted sketches for textiles. Treatment of natural and conventional forms.

(75) INDUSTRIAL ORGANIZATION AND ECONOMICS.

Elements of Economics: Production, value, exchange, distribution and money.

Business Organization and Finance: Partnership and companies. Raising of capital in various forms. Laws of Commerce in India.

Industrial Administration and Laws—"Scientific management" movement; industrial psychology, Labour problems. Partnership, Wage systems; production control. Safety methods and welfare work.

Factory Legislations.—Contracts of service and apprenticeship, their formation and discharge and the duties of master and servant thereunder. Employer's liability at common law. Factory Acts on Insurance, Wages, Hours of employment, Labour disputes, Dangerous trades, etc.

Cost Accounting aud Factory Control.—Costs of raw material, Structures, Equipments and their erection, Power, labour maintenance and repair. Capital depreciation, interest, etc., preconstruction cost accounting.

Factory records and book-keeping. Balance sheet. Graphical and Statistical control. Purchasing and stores organization, Marketing, Patents, Laws.

(76) TEXTILE CHEMISTRY (GENERAL).

Methods of Bleaching, Dyeing, Printing and Finishing. Dyes and their classification. Testing the fastness of dyed materials Description and working of Singeing Machines, Boiling Kiers, Washing Machines, Hydro-Extractor, Electrolyser for Sodium Hypochlorite, Cloth Squeezing machine, Scutcher, Drying Machines, Jiggers, Cheese Dyeing machine, Mercerising machine, water and starch mangles, Damping machins, Calendering machines, measuring and folding machines, cloth printing machines.

(77) PREPARATION AND SPINNING—II.

Silver Lap and Ribbon Lap machines, Nasmiths and Heilmann Combers, Mule Spinning.

General outlines of waste spinning machinery, thread extractor and roving waste opener. Principles of drafting, setting of machine parts, calculations relating to gearing, speeds, production and efficiency of machines, power consumption, etc.

(78) PREPARATION AND WEAVING—II.

Hank sizing, warp sizing, sectionl warping, Scotch Dressing machine, sizing recipes, Chemistry of sizing materials.

Description and working of Dobbies, Jacquards, Drop Box Looms, Circular Box Looms, Looms for weaving special fabrics and automatic looms, Terry Reed Motion, Jacquard Harness Building, Card Cutting, Card Lacing, Calculations relating to gearing, speeds, production, power consumption and efficiency of machines.

(79) FABRIC STRUCTURE AND DESIGNING—II.

Bedford Cards, Welts and Pique, Backed fabrics, Terry Pile Fabrics, Plain and Fancy Double Cloths, Leno and Gauze Weaves, Damasks and Brocades and Quiltings, Extra Warp and Extra Weft Figuring.

Adoption of design to the scale and quality of texture. Designing patterns suitable for weaving on Jacquard machines. Economical distribution of colours in a design.

(80) CLOTH ANALYSIS AND COSTING.

Comparative examination and testing of fabrics for weave, quality, material used, balance of structure, shrinkage, twist, strength of threads. Quantitative and qualitative analysis of mixed yarns and fabrics. Determination of grey particulars from

dyed, bleached and finished fabrics. The effect on the appearance and strength of cloth due to alterationss in structure. The effect of twist, high and low temperatures and moisture on the strength and appearance and the behaviour of threads and fabrics.

Costing of yarn, Quantities calculations, Warp and Weft construction, wage calculations, Yarn Prices, Distribution of overhead charges.

(81) TEXTILE ENGINEERING.

Machine drawing. Drawing of textile machinery parts.

Epicyclic wheel trains and differential motions. The winding mechanisms on the flyer frame, the mule, the ring frame and the weft winding machines. Kinematics and the dynamics of the power loom. The motion of the slay. Picking motions.

The effect of varying the speed of the machines on the power consumed, on the production and the quality of the output. Power required by various parts of the machines, by belting and by shafting. The balancing of machinery in motion.

(82) MILL PLANNING AND ORGANIZATION.

Factors affecting the selection of sites for spinning and weaving mills. Layout of buildings and machinery for various classes of work. Heating, lighting, ventilating and humidifying of textile factories. Effect and uses of colour inside a mill. Driving systems for the machinery.

Selection of machinery, materials and labour for a mill. Estimation of efficiency. Methods of wage payment in the different sections of the industry.

The factory law as applied to textile factories. Workmen's compensation. Accidents. Fire, etc. Labour problems. Training of operatives. Welfare work.

(83) ECONOMICS OF COTTON INDUSTRY AND TRADE.

Growth of the cotton industry, changes in its organization, relative importance of important cotton manufacturing countries in the world. Various markets for cotton. Variation in prices. Futures, hedging, marketing of yarn and fabrics. Import and export trade. Handloom weaving industry.

APPENDIX XIX.

B. T. DEGREE EXAMINATION.

SYLLABUSES.

A. GENERAL PRINCIPLES OF EDUCATION.

(1) *The approach to Education : Historical.*—Outlines of ideals and practice in Ancient, Mediaeval and Modern times.

(2) *The approach to Education : Scientific.*—Need for the aid of Biology, Physiology, Psychology, Sociology, Logic and Statistics.

(3) *Aims of Education and their evaluation.*—Livelihood; Learning; Social efficiency; Character; Leisure.

(4) *The Educative Process*:

A. i. as the sharing of Traditions or Social Heredity.

ii. as the achievement of many-sided interest.

iii. as adjustment between the individual and his environment.

B. i. *The nature of the Environment*:—The world of Nature, the world of Men, the world of Values.

ii. *The nature of the individual*:—Need for the study of general development of body, intellect, skills, character, sociability, taste. The problem of Individual Differences.

C *Consequent Problems*:—

i. Child and Subject; Learning and Teaching; Individual and Society (School, Home, State).

ii. The problem of the curriculum. What to learn and teach ?

iii. The problem of Method. How to learn and teach ?

(5) *Aspects of the Curriculum*:—

(a) Dependence upon aim.

(b) Theory of Formal Discipline.

(c) Knowledge and experience.

(d) Instrumental subjects—Reading, Writing, Arithmetic.

(e) The place of Physical Activities, Handwork, Art, Music, Literature, History, Geography, Mathematics, Science.

(f) Integration of the Curriculum.

(g) The problem of pre-vocational and vocational training.

(6) *Aspects of Method*:—

(a) Child and Class: Play and Work.

(b) Theories underlying some modern methods, *e.g.* The Montessori Method, The Dalton Plan, The Project Method, The Winnetka Plan, The Decroly Class.

(c) Current experiments in Indian Education, *e.g.* The Wardha Scheme, Shantiniketan, the Hardwar Gurukul, etc.

B. EDUCATIONAL PSYCHOLOGY.

I. *Introduction*.—What is Psychology ? Relation to Educational Psychology. Educational Psychology—Its scope and methods.

II. *Basic factors*.—The Psycho-Physical Organism. Physiological basis of mental life, including the nervous and glandular systems, the senses, the sensory-motor arc. Human behaviour, variable and non-variable—stimulus and response—Conditioning. Heredity and Environment. The Problem of Consciousness—The three aspects of mental life, cognitive, affective, conative. Instinct and Intelligence.

III. *Knowledge and Learning*.—The training of the senses—Methods of sense-training—The Montessori Method. The study of cognition—sensation, perception, conception, apperception, memory, association, imagination, judgment, thinking, reasoning. Attention, interest and effort. The Laws of Learning—Remembering and Forgetting—the transfer of training—Fatigue. Stages of mental development. The General Nature of Knowledge—the stages in the growth of knowledge—place of language in the growth of knowledge—observation, classification, definition, explanation—Psychology of the Herbartian steps.

IV. *The Growth of Character*.—Instincts, their structure and classification—Instinctive Behaviour and its modification. The importance of Play. Imitation and suggestion. Feelings, emotions and sentiments—The unification of personality. Habits, will and character. The Group Mind. The Unconscious in Education. Mental Conflicts—the problem of Discipline. Stages of development.

V. Individual Differences due to heredity, environment, sex, capacity and growth.

VI. *Some practical Applications.*—Intelligence—its nature and measurement. Educational Test—their uses and value. Care of the gifted and the dull, the difficult and the physically handicapped. How to study—The Laws of Learning illustrated by reference to Handwriting, Reading, Arithmetic, Spelling. History and Poetry. Learning Curves.

C. GENERAL METHODS.

Teaching.—Aims—Maxims of method—Lesson planning and notes of lessons.

Types of Lessons.—Determined by aim—Inductive—Deductive—Drill—Review by Lecture—Appreciation—Discussion—Laboratory—Demonstration—Heurism—Supervised Study.

Teaching Aids and Devices.—Assignments—Questions—Answers—Exposition—Illustration (verbal—concrete) — Blackboard — Text-Books—Home-work—Note—books, etc.

Classification of pupils.—Measuring Devices—Tests—Marking—Examinations (essay type and new type)—Promotions.

Class Management—Economy of Time— Securing and maintaining attention—Influence of Teacher—Typical Problems.

Discipline—Changing conceptions of school discipline—Typical problems—Direct Control (Curative)—Indirect Control (Preventive)—Rewards and Punishments.

Moral Education.—Direct and indirect ways of moral education—Ethical—Social appreciation—Aesthetic appreciation.

Modern Tendencies.—Individual and Class Teaching—Experiments in "Adjustment to individual differences" and "Socialisation" such as Dalton Plan—Project Method.

D. SCHOOL ORGANISATION AND SCHOOL HYGIENE.

Material Condition.—Site—Building—Rooms—Lighting--Ventilation—Furniture—Play Ground—Garden—Sanitary Arrangements.

Management.—Staff meeting—Time-table—Libraries—Museum—Co-operation between School and Home—School Office and Records.

School Life.—Corporate life—School Assembly—Clubs and Societies—Hobbies—Self-Government—Games—Scouting—Excursions—School Magazines—Exhibitions —School Celebrations.

Hostel.—Location—Supervision—Sanitation—Equipment—Traditions.

Staff.—The Headmaster and his duties—Class teacher *vs.* Subject teacher and his relation to others—Inspection—Professional etiquette—Professional Organisation.

Hygiene.—

(a) Childrens' diet—Cleanliness of food—Feeding of School children.

(b) Clothing—Use and characteristics of good clothing.

(c) Cleanliness—Relation to health.

(d) Fatigue—Mental and Physical.

(e) The senses and their training—Defects of vision—Common eye diseases—Causes, signs and prevention of defective hearing and ear diseases.

(f) Training the child in the practice of Hygiene.

(g) Physical Education.

(h) The question of Sex Education.

(i) Medical inspection—School clinics.

(j) Common ailments.

(k) Infectious diseases—Symptoms, treatment, isolation.

(l) Temperance.

(m) School buildings and surroundings—Furniture and Equipment—Posture.

(n) First aid in minor injuries.

(o) Health Legislation affecting schools.

E (a) 1. PRINCIPLES AND METHODS OF TEACHING DRAVIDIAN LANGUAGES.

(*Tamil, Telugu, Malayalam and Kannada*)

It is presumed that in this course, the teacher will apply to the teaching of the languages the fundamentals of Educational Psychology learnt in the general class. It is necessary to adapt methods to the characteristics of the child in the different stages of its development.

Aims.—The usual attitude towards the mother tongue. The place of Dravidian languages in the curriculum. The necessity for directing

the child's capacities and interests to the practical needs of the present as well as the future. Thought and Language: Biological Significance. Functions of language—receptive, creative and expressive. The need for emphasising the language aspect in all departments of knowledge. Use of the mother tongue in the various grades of teaching. The need for efficient teachers of the mother tongue.

Methods.—Old methods and reformed methods. The Play Way, Projects, Dramatisation. Creative work. Supervised study. Individual work. How and when a foreign language can be begun and its relation to the study of the mother tongue—the place of translation.

Adjustments of the contents and methods to the various grades—early, middle and high.

The Primary School.—The most important period—the foundation for correct speaking, reading and writing—oral work, conversation—direct association.

Training in correct speech—the teachers' use of phonetic methods.

Topics of interest to pupils—home, relations, friends, food, clothing, play, gardens, festivals, etc.

Handwriting, spelling, etc.

Reading.—To follow conversation. Various methods—alphabet, Look and Say, Phonic, Phonetic, the word and sentence method, relative merits and demerits. Preparation of reading charts by teachers—vocabulary lists for pupils of various stages, vocabulary to consist of useful words of frequent occurrence.

Fluency and expressiveness—the objectives in reading aloud.

The reading of poetry—meaningful emphasis—the use of sing-song and suitable intonation.

Silent reading—avoidance of vocalisation by pupils in this process. Training needed in reading, silent and oral. Tests with time limit.

Poetry.—Nursery Rhymes and action songs in the earlier stages—consideration of the need for didactic verses—need for memorising music and its place in the teaching of poetry.

Readers.—Choice of suitable books—simple and familiar topics, correlation with subjects, suitable illustration, etc. The need for humour.

Selection of books with a view to enriching pupils' knowledge of literature. Non-detailed texts—rapid silent reading. Use of dictionaries, library books, newspapers.

Grammar.—Functional Grammar, grammar only a means to an end—to speak and write correctly. Correlation of grammar with texts. The inductive mothod.

Loan words and new expressions (influence of Sanskrit and English).

Rhetoric and Idiom.

Consideration of suitable extracts from literature with a view to emphasising qualities of construction, style, figures of speech, etc.—poetic diction.

Fundamental differences between poetry and prose; forms of poetry; rhyme and rhythm; appreciation of imagery—Dramatic literature—the Novel.

Composition.—Reproduction—gradual development of different types of free composition. Need for personal expression. Concrete topics in the early stages.

Oral to precede written; dialogue; debates; Littleman lectures.

Surrender value of language work—letter-writing, etc. Types—descriptive, narrative, reflective. Sentence structure, paragraphing, spelling, punctuation, handwriting.

Creative expression—Story writing, Imaginative experiences, Drama.

Examination —New Type tests—the comparative merits of the old and the new tests.

It is necessary to give a short account of the history of literature—Tamil, Telugu, Malayalam and Kannada, emphasising the important landmarks.

E (a) 2. THE TEACHING OF URDU.

General.—Aims and objects of teaching and studying language—relation between Thought and Language. Relation between Language and Speech. Aspects of Language Study. Language as a factor in national culture, as a factor in individual culture. Theories regarding the origin and development of language.

Urdu.—Place of Urdu among Indian Languages—its affinity with other Aryan Languages—Semitic influence on Urdu. Origin

and development of Urdu Language and Literature. Urdu as an educational instrument—the practical and cultural value of Urdu—Urdu as a medium of instruction and of expression—its position in a scheme of mass education and drive against illiteracy. Colloquial and literary Urdu—high standard of attainment—Genius of the Urdu language. Use of the mother tongue in different stages of education. The Bilingual problem and its implications. The script reform problem.

Methods of Teaching.—Old Methods and Reformed Methods. The Play Way, Projects, Dramatisation, Creative work, Supervised study, Individual work. How and when a foreign language can be begun, and its relation to the study of the mother tongue.

Adjustment of the contents and methods to the various grades, early, middle and high.

(i) *Oral work.*—Its prominence in the early stages. The value of Phonetics. The sounds of Urdu and the study of their production—their representation in Phonetic symbols. Comparison of Urdu and English sounds.

(ii) *Conversation.*—Its priority over reading. Conversation free and limited. Conversational methods in teaching the language.

(iii) *Reading.*—Reading and Culture. Creation of interest in reading. The function of the Reader.

The Text.—The basis of instruction. Digression. Methods of explanation of the text—the objective method—the verbal explanation method. Use of English in explanation. Word and phrase drill. Oral composition. Improvement of vocabulary. Study of the beauty of expression in Prose and Poetry—of Rhyme and Metre. Intensive and extensive reading—detailed and non-detailed texts. Silent reading.

Grammar.—The place of Grammar in the teaching of Urdu. Grammar as the logic of speech. Traditional and reformed methods of teaching Grammar. Deductive and inductive methods. Correlation of grammar with the text. Formal and practical grammar. Teaching correct pronunciation—correct spelling. The function and form of words, word-order, the idiom. Sentence-structure, parsing, analysis. Grammar drill. Grammatical peculiarities of Urdu as compared with those of English.

Composition.—Oral composition. Written composition. Correlation with text and grammar. Types of composition—Free composition, Textual composition, Letter writing, Epitome, Expansion, Paraphrase, Translation. Style in Prose and Poetry. Elementary rules of Rhetoric and Prosody. Figures of Speech. Correction and valuation of written exercises.

Handwriting.—Urdu script. Transcription. The three forms of handwriting, Naskh, Nastaliq, and the Thulth.

Organisation.—of Urdu teaching in schools—time-tables—syllabuses. Notes of lessons. Class-room requirements. Class Libraries.

Books recommended for consultation.—

1. L. Bloomfield: An Introduction to the Study of Language.
2. Otto Jesperson: Language.
3. Otto Jesperson: Grammar.
4. Dr. Zur: Hindustani Lisaniyat (Urdu).
5. Dr. Zur: Hindustani Phonetics (English).
6. E. H. Palmer: Oriental Penmanship.
7. Mirza Askeri: Tarikhi-Adabi-Urdu (Saksina).

E (a) 3. THE TEACHING OF SANSKRIT.

1. *The Sanskrit Language*:

(a) Its nature and peculiarities—special difficulties—Language forms, idioms, etc. Comparison with other South Indian Languages and English—The Influence of Sanskrit on them—Special reference to the Mother tongue.

(b) Sanskrit as a written language and as a spoken language.

(c) The value of the study of Sanskrit—practical, cultural, literary and linguistic.

2. *The place of Sanskrit in the School Curriculum.*—The stage at which Sanskrit may be begun. Sanskrit in the lower and upper secondary grades. Differences in scope and standards. Definite indication (of scope, standard) by detailed syllabus. Time distribution for Prose, Grammar, etc.

3. *Teaching of Sanskrit and its Organisation.*—(a) *Methods* appropriate to the various grades of pupils—The Traditional method—the translation method—the direct method—the advantages and limitations of each—their relative merits—possibilities of their

being adopted in combination—The Sounds of Sanskrit—Detailed study of their production, the organic and acoustic methods of studying Sanskrit sounds. The means of teaching them to pupils.

(b) *Oral work.*—Pronunciation, intonation, etc.—Vocabulary building—word combinations—Simple oral composition—Picture reading—Oral Drill.

(c) *Written work.*—Letter formation—Transcription—Dictation—Spelling—Simple composition exercises—Reproduction after oral composition—Free composition—Epitomisation of read passages—Written Drill.

(d) *Recitation.*—Prose and Poetry—Differences in structure etc. Recitation of learnt passages in prose and poetry—The use of appropriate Ragas—Learning and reciting simple verses containing moral maxims and prayers—Selections from literature for recitation in the later stages to inculcate interest and joy in the learning of Sanskrit—The proper method of reciting verses—Proper accent and emphasis to bring out the meaning.

(e) *Translation.*—Sanskrit to mother tongue or English and *vice versa*—Graduated exercises suitable for the various forms.

(f) *Grammar.*—The teaching of grammatical forms *re:* nouns, adjectives, verbs, sandhis, samasas, etc.—Gradation of grammar exercises for the different classes—Grammatical drill—The inductive and the deductive methods and their relative merits—Comparative Grammar.

(g) The *Text-book* as the centre of instruction.—Non-detailed study in the higher forms—The relative volumes of prose and poetry in the text-books for the different classes—Topics treated to include modern life situations—The use of the Dictionary and the Kosas—Relation of text to teaching of grammar, idiom and composition—Diction.

(h) *The Sanskrit Library.*—The class room, its equipment and atmosphere—Practice and Drill charts.

(i) *Tests and Examinations.*—Pupil's difficulties, diagnosis and remedial work.

4. *The Sanskrit Teacher.*—Equipment—adequate knowledge of Sanskrit Language and Literature—Phonetic background and Philology—Knowledge of Psychology of Language Learning—Proficiency in the mother tongue of the pupils—Knowledge of English.

E (b) METHODS OF TEACHING ENGLISH IN INDIA.

A. GENERAL.—

I. *The position of English in India.*—Discussion of the aims of learning English in India. The bilingual problem in India and other countries. The question of the medium of Instruction. Books on the teaching of English. The limited usefulness in India of such books written for (a) English and (b) continental pupils because of the different situation and needs of those pupils. Brief comparison of English and South Indian Languages. The influence of good teaching of the mother tongue on the learning of English.

II. *Methods of Teaching Modern Languages.*—The translation and grammatical method. Reasons for the rejection of the rigid application of this method in the teaching of school children.

Reform methods: (1) the natural method; (2) the direct method, its aims and principles. Criticism of certain of its tenets and of their application; (3) Basic English.

The complete method, aiming at the development of all aspects of language learning with a view to achieving practical results.

III. *Psychology of language learning applied to the Teaching of English in India*—Interest, imitation, habit formation, etc., in the teaching of English. The use of individual and group methods. The art of questioning in English teaching. The play way of teaching English. Word counts. Achievements.

IV. *The Organisation of English Teaching in Schools.*—A consideration, based if possible on a survey made by students in one or more schools, of (a) the stage at which the study of English is begun, (b) the time devoted to English in different forms, (c) the time devoted to languages in different forms, (d) schemes of work and the time given to different aspects of English teaching.

The English teacher, the school library, the school museum and collections of pictures as used in the teaching of English. The English class room.

Teachers' notes of lessons. The importance of complete records of English teaching and of work done (*e.g.* new words and phrases taught). The co-operation between teachers of English and teachers of other subjects.

Examinations in English: (1) internal examinations and their organisation, the scope and form of such examinations; (2) the external examination. Consideration of the S.S.L.C. examination and its influence on the teaching of English; (3) standardised achievement tests in English.

B. THE TEACHING OF ENGLISH IN THE EARLY STAGES (TO FORM III).—

I. *Oral Work.—Conversation*—the value of sub-conscious comprehension before speech; the question of the priority of conversation or reading; the importance of repetition; the importance of simplicity of language and of the grading of vocabulary and sentence forms; the use of pictures and objects to prevent the undue intervention of the mother tongue; the use of drama and play methods.

The Teaching of pronunciation.—the psychological and physiological bases of speech, elements of phonetics with particular reference to speech sounds in English that present difficulty to Indian pupils. An elementary study of intonation. Practical exercises in voice production.

II. *Reading.—The Beginnings of Reading.*—Different methods of teaching reading to beginners—a comparison between the problem of learning to read the first and second languages.

DETAILED STUDY.—*The text as the centre of instruction; extent to which digression is desirable. Methods of explaining the meaning of words, phrases and idioms. The use of the mother tongue in explanation. Extension of active and passive vocabulary. Relevant grammar for understanding the text. Drill in the use of new words and phrases. Pupil's word and phrase books, their arrangement. Types of exercises based on the Reader for oral and written work. Requisites of a good Reader. Consideration of existing Readers*—the reasons for the use of word frequency lists on a graded vocabulary basis. A consideration of vocabulary and sentence forms to be taught at different stages.

Extensive Reading.—The function and treatment of non-detailed texts. Creation of interest in reading. The stage at which extensive reading should be introduced. *The importance of silent reading. The formation and use of class libraries.*

III. *Poetry.*—The stage at which this teaching should be begun. Selection of suitable poetry for different stages. *Methods and aims*

in teaching poetry as contrasted with the teaching of prose. The teaching of recitation.

IV. *Grammar.—Views regarding the function of grammar in the learning of languages.* The unconscious assimilation of grammatical forms, a preparation for the formal learning of grammar. *Inductive and concentric methods of teaching grammar. Correlation with the study of texts.* Stage at which the study of formal grammar should be begun and the content of a middle school grammar syllabus. Consideration of grammar text-books for beginners and their place in the teaching of English. Formation of concentric graded syllabuses. *The need for uniformity in grammatical terminology.* The medium of instruction in grammar. *The connection between the teaching of the grammar of the mother tongue and of English.*

V. *Handwriting, Spelling and Punctuation.*—Cursive and script writing. The use of copy books. Transcription. Attention to particular difficulties in and stage of introducing the formation and joining of letters, spacing, syllabification, etc. *Attention to handwriting in all kinds of written work.* Spelling and dictation. The teaching of punctuation.

VI. *Composition.—Correlation with the teaching of the text, grammar and word lists.* Progress from reproduction to free composition; the importance of fluency exercises and oral work. *The use of exercise designed to correct common errors in Indian usage.* Story reproduction, the use of dialogue, drama and pictures. Types of composition suitable to the early stages. *Informal testing. New type tests. The setting, correction and return of tests. The importance of the careful correction of written work by the pupils.*

C. THE TEACHING OF ENGLISH IN THE HIGHER STAGES (FORMS IV, V AND VI).—

The syllabus given below is intended to supplement the relevant (italicized) portions in the corresponding sections of the syllabus for the early stages. These portions should be referred to again in connection with the teaching of High School pupils.

I. *Oral Work.*—The importance of the oral preparation of essays and of oral summaries, narratives and discussions based on reading. Recitation of prose and verse.

II. *Reading—Detailed Study.*—Sentence and paragraph study. The choice and use of words. The use of dictionaries. Oral and

written exercises suitable for use with detailed texts. The place for the study of language and of literature in the teaching of English.

Extensive Reading.—Book lists for High School forms. The place and importance of vocabulary selection in the editing of books for extensive reading. Oral and written exercises based on extensive reading.

Study of English Life and Customs.—Stage at which this should be introduced, methods of study. Contrast between the conditions of Indian, and French or German pupils in this connection.

III. *Poetry.*—Different types of poetry suitable for study in the High School. Mood as important as meaning. Knowledge of background, visualisation, study of choice of words, rhyme and rhythm, all aids to appreciation. Explanation of simple figures of speech as found in texts. Methods of procedure, and oral and written exercises suitable for use in poetry lessons.

IV. *Grammar.*—Universal grammar and English grammar. The function and form of words. Word order. The importance of analysis. The purpose of drill exercises in the transformation of sentences. A consideration of existing grammar books. The formation of graded syllabuses. Methods of teaching grammar in High School forms. Correlation with the teaching of the detailed text and composition.

V. *Handwriting, Punctuation and Spelling.*—Syllabification. The punctuation of abbreviations. Recognition of right and wrong spelling.

VI. *Composition.*—Types of composition suitable for the higher stages : (a) essays, narrative, descriptive and reflective, (b) letter-writing, (c) epitome, (d) expansion, (e) paraphrase. The importance of concreteness in topics set for composition. The construction of the essay. Principles of sentence and paragraph structure. Oral and written preparation essential. Inductive methods of teaching composition. Correlation with the study of good prose in intensive and extensive reading. Systematic correction and valuation of written exercises. Code of corrections for large classes.

VII. *Translation.*—Its practical and linguistic value. Principles of translation. Stage at which it should be introduced. Correlation with the study of grammatical and idiomatic differences between English and the mother tongue.

E (c) PRIMARY EDUCATION.

I.

Principles and methods of child study. Outlines of the History of Child Education with special reference to Rousseau, Pestalozzi, Froebel and Montessori.

Experimental observations; physiological considerations—the child's instincts.

Stages of child development—study of exceptional children and methods of dealing with them.

II.

A survey of recent experiments in methods of child education. Theories of Play and Play methods; importance of play in the development of the child; free and organised play; consideration of the choice of a child's play things and occupation materials.

III.

Self-activity, continuity, connectedness and creativeness as guiding principles in early education.

IV.

The Pre-School Stage (3 *plus to* 5 *plus*).—The development of the child from birth to 5 years of age. The training of the senses. The growth of language. Spontaneous self-activity—Imitation—Fear—Instincts—Interests. The contribution of the Kindergarten and Montessori methods to pre-school education. The organisation of the Nursery School: Nourishment—Children's ailments, symptoms and remedies—Home conditions—Health Habits—Free Play—Games—Sense Training—Language, stories, rhymes, songs—Formation of habits—Rest and sleep—Open air work—entertainments.

V.

(i) *The Junior Stage* (6 to 8 *plus*).

(ii) *The Senior Stage* (9 *plus* to 12 *plus*).

Methods appropriate to the teaching of (a) Language, number and space, (b) Natural interests (social and "scientific"), (c) Class singing with special emphasis on rhythm, simple eurhythmics, (d) Drawing and Handwork, (e) Story and dramatisation.

VI.

Correlation in the teaching of the various subjects, in the framing of syllabuses and time-tables and in the application of the Project Method.

VII.

Environment; fatigue; discipline.

VIII.

Measurement in Primary Education: Mental and scholastic tests, Individual and group tests. Problem of deficient, retarded and specially gifted children. Difficulties in reading, writing, spelling and arithmetic: Diagnosis, remedial work. Programmes for testing efficiency of instruction. Classification of children for instructional purposes within class and school.

E (d). THE TEACHING OF MATHEMATICS.

1. Aims in Teaching Mathematics.—

(i) The nature and scope of Mathematics; its relation to other branches of knowledge, *i.e.* physical and natural sciences, logic, philosophy and economics.

(ii) Value of Mathematical education, practical, disciplinary and cultural.

2. The content and organisation of school Mathematics.—

(i) Curriculum construction. History of Mathematics. Curriculum in our schools. Modern tendencies. Compulsory and elective courses. Nature of mathematical ability. The Syllabus: Primary, lower and upper secondary courses.

(ii) Organisation of the curriculum:—The logical and psychological orders of development. Topical *versus* spiral method. Incidental *versus* systematic development. Projects and activity programmes. Correlation with life and the other subjects of the curriculum. Correlation of the different branches of Mathematics among themselves. Correlation of the different topics of the same branch.

3. Methods of teaching Mathematics.—

(i) The value of the study of History of Mathematics and Mathematics teaching. The development of Mathematical knowledge by empirical, intuitional, creative and rational processes. History of the important topics of elementary Mathematics, *e.g.*, notation, metric system, directed numbers, function concept, parallel postulate. Contribution to the pedagogy of Mathematics by eminent educators, *e.g.*, Froebel, Herbart and Montessori.

(ii) The problem of securing interest, effectiveness and impressiveness. Motivation. Nature of interests of children and school boys. Puzzle instinct, game instinct, use of the concrete, practical work, laboratory method. Outdoor work. Problems, exercises, their nature and use.

(iii) Empiric stage and the rational stage. Working knowledge and knowledge of principles underlying processes. Teaching rules and general principles. Solving problems.

Heuristic *versus* Dogmatic method; inductive and deductive methods; analytic and synthetical methods.

(iv) Short and easy methods. Means of developing speed and accuracy.

(v) Class *versus* individual teaching, Dalton Plan; Supervised study, assignments. Class Teaching, questioning, Oral work. Written work. Individual work, home-work.

(vi) Detailed consideration of the several topics in the Elementary and Optional Mathematics Syllabuses as to method of organisation and teaching.

(vii) The medium of instruction. Text-books. Illustrative materials, apparatus, and appliances. Blackboard. Notes of lessons and teachers' record of work. Pupils' note-books. Mathematical laboratory and library. Pupils' Association.

4. Tests and Examinations.

Sources of errors and uncertainties in setting questions and valuing answer papers. The various forms of new type tests; standard tests, their value and limitations. Treatment of errors.

Standardardisation of tests. Fundamental ideas of statistical methods applied to educational problems. Statistical Data; their collection and presentation; statistical averages and correlation.

E (e) and (f) SYLLABUS IN PHYSICAL SCIENCE AND IN NATURAL SCIENCE.

PART I—(*Common to both*).

1. *History of Science Teaching*:—Development of science teaching in Universities and Academies—The place of science in the modern curriculum of studies in schools.

2. Aims and values of Teaching Science in Schools.

3. *Scientific Method.*—What it is—inductive and deductive thinking—Analysis and synthesis—Imaginative Hypothesis, testimony and authority—Collection of facts and data—Conclusions—Testing the validity of Scientific Theories—Application of this method to Physical and Natural Science.

4. *Methods of Teaching Science.*—Lecture—Lecture Demonstration—Development method—Heuristic method—Problem method—Individual method—Dalton Plan—Project method—Supervised study—Application of these to the teaching of Physical and Natural Science.

5. *Methods of Testing*:—Oral—Essay type—new types of tests. Practical Examinations. Validity, reliability and objectivity of tests.

PART II—(*Physical Science*)

1. The relation of physical science to the other subjects in the curriculum.

2. *Determination of the Curriculum*:—Science interest and activities of children at different levels—Popular Science—Historical considerations—Environment conditions—Hobbies—Constructive activities—Drawing up of syllabuses, with special reference to the requirements of the local schools—General Science and specialised study.

3. *Aids to the Teaching of Science*:—Text-books—Laboratories—Laboratory planning and equipment, Laboratory management, preparation of indents—Workshops—Excursions and visits to works, Museums—Exhibitions—Library—Films—Optical Lanterns—Wireless—Science societies and clubs—Records and notes—Teachers' preparations—Teaching notes.

4. *Practical work:*

A. The practical work will include the setting up of demonstration apparatus, the making of charts and illustrations, use of school and home made apparatus, photography and preparation of lantern slides. (Wood work, metal work, and glass blowing, wherever possible).

B. The course should also include an elementary knowledge of the practical work as applied to the Natural Science section of the general syllabus of the Schools.

PART II—(*Natural Science*).

1. The relation of Natural Science to the other subjects in the curriculum.

2. *Determination of the curriculum.*—Courses of Study—principles underlying schemes of lessons—logical, psychological and seasonal arrangements of topics—the concentric system—General Science and specialised study.

3. *The Teaching of Natural Science:*—Observation and study of actual specimens and organisms in the field. The value of diagrams and descriptions by pupils—central and demonstration experiments. Relation of organisms to environment—adaptations, continuity and evolution of life—development of the type concept—Principles of classification.

4. *Aids to Teaching:*—School garden—collection and preservation of plants and animals—Museum—Herbarium—Aquarium—Terrarium—their maintenance. Diagrams, charts, photographs, lantern slides, films—excursions, exhibitions, library; nature clubs and societies. Text-books—Laboratory planning and equipment—Laboratory management—preparation of indents—Records and notes—Teaching notes.

5. *Practical work.*—

A. This will include a detailed study of the subject-matter for the different lessons in the various grades: the preparation and study of the different lessons in the various grades; the preparation and study of plant and animal specimens—the fitting up and carrying out experiments—keeping records, nature diaries and calendars—preparation of diagrams, charts, photographs and lantern slides: collection and preservation of plant and animal specimens for the

museum and of plant specimens for the herbarium. Work in school garden: maintaining aquarium and terrarium. (Practice in wood and metal work and glass blowing, wherever possible).

B. It should also include an elementary knowledge of the practical work as applied to the physical science section of the General science syllabus of the High Schools.

E (g). THE TEACHING OF HISTORY.

I. The Nature of History.

1. The scope and meaning of History:—(a) Biographical conception. (b) As record of the past. (c) Evolutionary conception—political and economic and social evolution of civilisation. (d) History as philosophy. (e) How real history transcends written history.

2. The History of History:—Evolution of the art of historical writing.

3. The Organisation of History:—Sources—their external and internal criticism—synthesis. Narrative, didactic aud scientific History.

4. Can History be a science?

5. The features or dimensions of History:—(a) continuity, (b) development, (c) time, (d) place.

II. Aims and Values.

1. *Aims:—*

General:—

i. Development of historical sense. Creation of interest in comprehending past and present.

ii. Securing of intelligent use of books and training in individual work.

2. *Values of historical instruction:—*

a. Cultural:

i. Social experience and study of human nature.

ii. Breadth of outlook—International outlook and world peace.

b. Practical.

c. Ethical.

d. Mental Training.

III. The History Syllabus at School.

1. *The curriculum content of graded history*:—(a) Biography, local history, national (Indian and British), European, Colonial and Imperial, World History including the story of ancient civilisations. (b) Chronological divisions of history--pre-history, ancient, mediaeval, modern, contemporary history and current events.

2. *Processes involved in syllabus construction*:—Principles of selection and gradation of material.

3. Teaching History backwards.

4. Civics.

5. *Correlation with other subjects*—The desirability of a unified social science or a Fusion Course.

6. Time allotted to History at School.

IV. Methods of Teaching History.

General.

1. Traditional Methods.

2. *New lines of approach*:—To develop imagination and stimulate thought; suggested lines of procedure:—

   i. Types of recitation:—Inductive recitation, lecture recitation; socialised recitation: review and Drill recitation; recitation based on home study.

   ii. Topical history—Problems and projects—tracing logical consequences and geographical influences—proper reviews.

   iii. Graphical and pictorial charts.

   iv. Preparation of stories, letters, eye-witness accounts, diaries, conversation, songs, ballads, plays, pageants, etc.

   v. Pupils' work:—

      (a) Individual :—Sources, collateral reading, essay, practical work, monthly test, note-making and note-taking.

      (b) Co-operate:—Lectures, discussions and debates: drama, handwork, excursions and expeditions.

   vi. Laboratory work.

3. Teacher's Self-checking in History teaching.

V. Division of the School Course.

1. Division into (a) Primary stage, (b) Middle School Stage, and (c) High School Stage.

2. Need for the co-ordination of these syllabuses for the three stages.

3. A specimen syllabus for each stage and the study of syllabus now in use.

VI. TEACHING IN THE PRIMARY STAGE.

(1) Special aims, (2) Selection and gradation of material, (3) Mothods of Teaching (General Principles. Oral Teaching. Use of Text-book and appliances, the pupil's note-book), (4) Correlation, (5) Dramatisation, (6) Suitable excursions.

VII. TEACHING IN THE MIDDLE SCHOOL STAGE.

(1) Special aims, (2) Matter and its organisation, (3) Methods of Organisation of material (*e.g.* The Concentric, Spiral, Periodic, Chronological, Regressive, Topical and Type Methods), (4) Methods of Teaching (Text-book, its requirements and treatment ; Chronology, Correlation, Self activity of pupils, suitable excursions).

VIII. TEACHING IN THE HIGH SCHOOL STAGE.

1. Special Aims.

2. Matter and Method of organising it.

3. Methods of Teaching—(Oral presentation; text-book: Multiple text-book; Collateral reading: Library equipment; the comparative, topical, Source problem and Project Method).

4. Written Exercises.

IX. Historical Fiction.

X. The Medium of Instruction in History.

XI. The History Examination.

XII. The History Teacher.

XIII. The History Library.

E (h). METHODS OF TEACHING GEOGRAPHY.

Note—

i. Questions on method may require also the drawing of a sketch map for illustration in teaching.

ii. Practical work should include the study of the locality, the making of teaching equipment, practice in the use of the blackboard (particularly in developing the map as the lesson proceeds), classification and arrangement of equipment; the preparation and the giving of lesson and lantern lectures.

I. The place of Geography in Education with special reference to its use in training for citizenship and in promoting international understanding.

II. The content of School Geography and its relation to other school subjects :—

(a) The selection of subject-matter with reference to mathematical, physical, economic, historical and political geography, the geography of current events, regional (including local, Indian and World) Geography.

(b) Introduction to the tools of Geography and the extent of training in the use of them in the three stages—observation and recording; maps, diagrams, statistics, etc.

III. The Direct Study of Geography.

The observation and expression of the facts of local Geography; the possibilities and uses of different environments. (This should be done through a practical study either of the student's home region or of the home region of the Training College.)

IV. Training in the use of maps, graphs and diagrams.

A. *Maps*—

i. Introduction to maps through the pupil's own sketch-plan of his immediate surroundings; the progression to the idea of scale and relief; the transitions, from the local map to the Atlas map, from the globe to the flat map; place of the picture-map and the photo-relief map.

ii. Map-reading—practice in correlating maps and suitable exercises on (a) 1" and larger scale topographical maps, (b) distribution maps (climatic, economic, etc.) Characteristics and limitations of projections in the school atlases.

iii. Simple surveying—its value, possibilities and limitations in the school course.

iv. Map-expression—the importance of progressive training in drawing sketch-maps and in making maps from data supplied.

B. *Graphs and Diagrams*—their variety, purpose and use; the desirability of their introduction in simplified forms in the early stages.

V. The purpose, place and method of regional geography—selection of appropriate regions and methods (*e.g.* descriptive or systematic) for the various stages of the school course.

VI. The scope and treatment of the following in the three stages:—

(a) Weather and climate; maintenance of school records and use of weather reports.

(b) Astronomical and mathematical geography.

(c) Land forms.

VII. Problems peculiar to the Teaching of Geography in South Indian Schools:—

1. Translation of technical terms.
2. Standards to be adopted in the spelling and pronunciation of geographical names in English and in the Indian language.
3. The regional unit; its relation to the political and administrative divisions of South India.

VIII. *The Teaching Syllabus.*—The necessity for a "teaching syllabus" as distinct from the school syllabus. How to plan effectively so as to secure due emphasis on (a) Observation work, (b) regional geography, (c) training in the use of maps, etc., (d) testing.

IX. *Methods of Teaching*:—

(a) The value and possibilities of the following in the three stages—geography story, description, exposition, inductive and deductive method, visual illustration, individual and group methods.

(b) The Organisation of the Geography lesson:—

i. the class lesson, its place in the 'lesson unit', the use of the blackboard, wall-maps, wall-pictures, the globe;

ii. the out-door lesson—observation and experession; day excursions and the school journey.

(c) The work of pupils—the importance of the assignment; the value and use of practical note-books; the pupils' note-books, geography homework (including type of work and time allotment).

(d) Testing results—the purpose and method of testing; its use as drill; factors to be tested including (i) the knowledge of facts and locations, (ii) the exercise of geographical reasoning and the ability to apply geographical knowledge; types of tests and their value.

X. *The Geography Room and its Equipment*:—The necessity for a separate geography room. Minimum essentials in equipment; the classification, storing and caring of equipment; the making of equipment—enlarging and duplicating of maps, the making of relief models, the collecting and storing of pictures and specimens; text-books, sources of information, atlases and reading matter suitable for each stage.

E (i) METHODS OF TEACHING HOME SCIENCE.

Sections A and B to be taken by students holding the B.Sc. Degree in Home Science.

Sections A and C to be taken by students not holding the B.Sc. Degree in Home Science.

Section A.

I. Nature of Home Science—

Its aims and values in relation to the needs of the pupils and to the general scheme of education.

II. Characteristics of a successful Home Science teacher; personal traits; educational experience; her understanding of the girls, their homes, their traditions and social environment; her relation to the school.

III. Methods of instruction applicable to Home Science teaching; discussion or development method, demonstrations; practice or laboratory method; problem or unit method, based on life situations; lecture method, its limitations; project methods in an integrated school programme: home projects and their guidance; discussion of the school lunch as an educational project; value of field trips and supervised study.

IV. Lesson Planning—

Individual work; group work; community enterprise. Organisation according to subject-matter and method used, and the social environment of the pupils.

Planning of lessons; the time factor; the relation of theory, demonstration and practice; written work by pupils; home work; the teacher's notes of lessons.

V. Modern methods of evaluating results of teaching, theoretical and practical.

VI. Aids to teaching—

Illustrative material; bulletin or interest board; text-books; Home Science Library; magazines, and journals, microscope; lantern slides; instruction sheets, etc.

VII. Home Science Room—

Location, size, attractiveness; furnishing and equipment, suitable to the locality. Value of home making houses and cubicles. Teachers' responsibility for care of equipment, use of Home Science room and equipment by other groups.

Section B

I. The scope of Home Science and the possible development of existing courses.

II. The principles involved in syllabus construction. Gradation of materials according to age groups; their adaptation to the locality, to the natural products available and to other facilities within the district.

Correlation of Home Science with other school subjects.

III. The management of the Home Science Department—

Business and finances, methods of financing (grants, fees, scales of work), accounts, records of lessons, inventories of equipment, library lists; storing of illustrative materials and other supplies.

IV. Practical Work—

(a) *Textiles and fabrics* used in India; sources, manufacture and use. Identification of fabrics by physical, chemical and microscopic means. Application of this knowledge

in purchasing materials. Value of knowing how to wash coloured and delicate fabrics. Materials and equipment necessary for washing, stiffening, and finishing of articles. Washing and finishing coloured garments, real and artificial silk, woollen garments.

(b) *Cooking—*

The application of methods of cooking to the planning and cooking of attractive and balanced meals for children, adults and invalids; the knowledge of the effects of heat on various foodstuffs.

(c) *Cleanliness and beauty* in the home and its sorroundings. Care of furniture, utensils, sanitary arrangements, etc.

V. The organisation of excursions (to such places as markets, a modern bakery, a laundry, water works, a textile mill, a soap factory) based on study of the environment.

Section C.

Nutrition: Food and health; energy requirement of adults in Indian foods which control growth and health; mineral constituents, vitamins. Dietary standards for adults. Deficiency diseases of India. Changing requirements of expectant and nursing mothers. Nutrition through the period of growth; the pre-school and school age child; feeding the family and planning diets. Diet for the sick in some common ailments.

Cookery: Indian and English weights and measures. Modes of heating foods in cooking; problems of cooking methods; full study of structure and composition of foods in relation to various methods of cooking. Choice of foods; food adulteration. Choice, use and care of utensils and apparatus in cooking. Practical Cookery.

Laundry: Choice and care of clothing; textiles and fabrics; action of acids and alkalies on materials. Nature of water and its effect on soap; stain removal.

Practical Laundry: Washing and finishing of silk, wool and coloured garments; materials and equipment necessary.

Housewifery: Care of the home, furniture and fittings, decoration and cleaning, household pests. Budgeting and simple account keeping. Money earning activities of the home; leisure time hobbies, such as gardening, poultry and bee keeping. Savings; wise investment of savings.

Bacteriology and Hygiene:

Bacteriology. The morphology of bacteria, yeast and mould. Their general function in nature and in the home; their relation to diseases and to preservation of food. Excursions to a bakery and a brewery if possible.

Maternity and Child Welfare: Necessity for Infant Welfare work. Causes of high rate of infantile and maternal mortality in India. Study of welfare schemes in local areas. Pre-natal work. Maternity and Child Welfare Centres; creches; Natural and artificial feeding; the development of the normal child; evils of marriage of the diseased and the feeble minded.

Excursions to Welfare Centres, Nursery Schools and Hospitals.

General Hygiene: Sources of water supply; care of water in home, school and community. The removal and disposal of refuse. Use of disinfectants in the home. Excursions to Water Works, Model Housing Schemes, Sewage Works, Markets; Survey of cheries nearby.

Infectious diseases: Nature of infection and ways in which disease is spread; carriers; of diseases; animal parasites—susceptibility, immunity, vaccination, inoculation, injection. Anti-toxins, etc. Notifiable diseases. Disinfection.

E (j) THE TEACHING OF MUSIC.

1. The place of music in life. The cultural value of music, Intellectual, emotional, spiritual.

The place of music in the scheme of education. Aims and values; professional and cultural.

2. Origin and development of music and musical forms. Distinctive features of South Indian Music as compared with other Musical systems. The prominent South Indian composers and their contribution.

Absolute pitch and relative pitch. Scales of just intonation and equal temperament. Harmony and melody. Modal shift of tonic. Art music and applied music.

3. The music teacher and his equipment. The need for extensive repertoire on his part. An outline knowledge of the principal concert instruments (Tambura, Veena, Violin, Flute, Gotuvadyam, etc.), and their tuning. Avoidance of mannerisms,

The South Indian genius, tradition and philosophy. Psychology of Music. Musical ability and general intelligence.

4. Teaching of Music—Theory and Practice.

Physiology of the Voice. Study and classification of voices. Types of sārira. The breaking of the voice and setting in of the adult voice. Care of the voice during the period of transition. Voice production and voice culture. Extension of the range of the voice in the tara and mandra sthayis. Control of tone volume.

Notation. Sight-singing and aural training. Musical dictation.

Choice of music suitable to the various grades—primary, middle and secondary. Songs suitable for rural and urban institutions.

Preparation of the detailed syllabuses for the various classes and forms.

Teaching procedure. Creation of a musical atmosphere. Simple songs to be taught by rote in the earlier classes leading to gradual correlated instruction through parallel courses in graded songs, svara exercises, alankaras, geetas, varnas, etc. Musical games and action songs.

Methods of developing srutignana, svaragnana, ragagnana and talagnana. Extemporization. Appreciation of high class music.

Individual differences and teaching adjustments. Classification of pupils according to their musical ability—the talented, the average, and the dull. Encouragement of special talents.

Singing out of time and out of tune. Their causes and remedies.

Individual, group and class singing. Class arrangement and discipline. Class habits. Fixing a suitable pitch for the class. Testing devices and programmes.

Notes of lessons and records of work. Preparation of aids to teaching; musical charts, svara cards, etc.

5. The music room and its equipment. Music library. Textbooks. Practice and test cards, charts, current music literature, reports of music conferences, investigations, etc.

6. Music clubs—their organisation and function. Formation of Junior and Senior Choirs and Orchestras. Percussion bands in elementary schools. Musical evenings, concerts and periodical demonstrations by pupils. Music festivals and inter-school competitions. Excursions to places of musical (historical) importance.

APPENDIX XX.

M.Ed. DEGREE EXAMINATION.

SYLLABUSES.

A. EDUCATIONAL PSYCHOLOGY (THEORY AND PRACTICE).

1. *Introduction.*—

A. *Schools of Psychology*:—The introspective schools—Behaviourism—Gestalt Psychology—Psycho-analysis—Purposivism.

B. Methods of collecting data.

C. Statistical Methods:—

(a) The Frequency Distribution.

(b) Graphic methods and normal curve.

(c) Reliability of measures.

(d) Correlation.

2. The Inheritance of human traits:—Heredity—Laws of Heredity—Social Heredity.

3. The general development of the child:—Physical and mental (including the nervous system).

4. The Development of the special Mental powers of the child.

A. *Sensation*:—(a) Vision. (b) Audition. (c) Tactual sensation. (d) Taste. (e) Smell. (f) Kinaesthetic sensation. (g) Sense of equilibrium. (h) Organic sensation.

B. *Perception*:—(a) Perception of space. (b) Auditory space. (c) Illusions in space Perception. (d) Perception of movement. (e) Rhythm. (f) Perception of time. (g) General Laws of perception.

C. Instinct.

D. Attention.

E. Memory.

F. Reasoning.

G. Imagination and dreams.

H. Feeling and affection.

I. Emotion and Temperament.

5. Tests of (a) Physical and Sensory capacities. (b) Motor ability and mechanical aptitude. (c) Perception. (d) Attention. (e) Memory. (f) Imagery.

6. *The Learning Process:—*

A. Conditioned stimuli and conditioned reactions.

B. Laws of Learning.

C. Improvement in Learning.

D. The permanence of Improvement:—Remembering and Forgetting.

E. Continuous Practice—Fatigue in Learning.

F. Transfer of Training.

7. *The Measurement of Improvement:*—Educational tests—Standardised Tests in special subjects—Reading, handwriting, spelling, arithmetic, etc.

8. *Individual differences:*—Physical—Temperamental—Intellectual—Difference between sexes—Individual differences and vocational guidance.

9. *Intelligence: Its nature and measurement.*—The Nature of Intelligence—The Concepts of "G" and "S"—The growth of intelligence—History of Intelligence Testing—Standardisation of tests—Individual and group tests—Verbal and non-verbal tests—Uses of Intelligence Tests.

10. The backward child and the difficult child—the gifted child.

11. (a) The measurement of Personality and Temperament.

(b) Experimental Aesthetics and Art Judgment.

(c) Psychological Tests in Music.

(d) The detection of suppressed ideas.

B. EDUCATIONAL ORGANISATION AND ADMINISTRATION.

I. The 19th century and the movement for national education—A National system an expression of the national genius—Influence of historical, geographical, ethnological, political and economic factors on the systems of education in England, U.S.A., Germany, Italy, Russia, France and Japan. The aim of a national system of education—Indian Education from this point of view.

II. Education policy, (1) Aims, (2) Free and compulsory education at different stages, (3) Private and State education.

III. *Educational Control and Management.*—Educational authorities—Central, Provincial, and Local. The organisation and functions of managing bodies.

IV. *The work of the Headmaster*:—Co-operation with staff—allocation of work—distribution of staff—supervision—classification and promotion of pupils—discipline—extra-curricular activities—relations with parents and the community--school records, registers and returns.

V. *The work of the Inspector*:—Supervision and inspiration—co-operation with school authorities (management and staff)—methods of evaluation of the work of the school as a whole and of individual teachers—encouragement of experiments—co-ordination and sharing of experience.

VI. *Educational Finance and its administration*:—

1. Sources of income—state and private—central, provincial and local—Endowed and provided.
2. Grants-in-aid.
3. Free places and Scholarships.

VII. *Educational service*:—

1. Central Board of Education.
2. Research and Statistics.
3. Museums.
4. Libraries.
5. Bureaus.
6. Publications.
7. Exhibitions.
8. Broadcasting.
9. Film and Lantern libraries.

VIII. *Classification of schools*:—

(A) 1. Nursery, 2. Infant, 3. Primary, 4. Secondary.

(B) 1. Rural, 2. Urban.

(C) 1. Agricultural, 2. Commercial, 3. Technical, 4. Industrial.

(D) Special schools—schools for girls, for adults, for defectives.

IX. *Curricula:—*

1. Agencies for formulating curricula--Principles of the curriculum—Differentiation of curricula to suit different types of schools.

2. Text-books—Principles and agencies of prescription.

X. *The Teacher:*—Selection and training–Salaries, pensions and terms of service—Professional Organisations, National and International—Professional Etiquette.

XI. The External Examination.

XII. Education and Unemployment.

XIII. Trends in Post-War National Education abroad and current tendencies in India.

C. HISTORY OF EDUCATION.

I. WESTERN.

A. *Greek and Roman Education.—*

i. Education for citizenship.

ii. Individualism of later Greek Education.

iii. Practical aspects of Roman Education.

iv. Graeco-Roman Education.

B. *Education as Discipline.—*

i. (a) Monasticism, (b) Chivalry, (c) Scholasticism, followed by Dark Ages.

ii. Humanistic Education, its rise and decay into narrow Humanism.

iii. John Locke.

C. *Naturalistic Tendency in Education.—*

Naturalistic phase of 18th Century thought.

Rousseau's " Emile ", Basedow.

D. *Psychological Tendency in Education.—*

i. Its characteristics.

ii. Stages as seen through the work of personalities.

(a) Pestalozzian movement. Philanthropic Education, Education and development.

(b) Herbart's contribution.

Ideal of Education as Moral Man—Character.

Method based on "Fusion of Ideals."

(c) Froebelian Movement.

Law of Unity, Self-activity, kindergarten.

(d) Montessori (Fusion of Psychological and scientific tendencies.

iii. Influence on Content, Method, Discipline, Aim, Type of Institutions.

E. *Herbert Spencer and Scientific Tendency in Education.*

F. *Sociological Tendency in Education.*

Sociological aspect of Pestalozzi, Herbart, Froebel.

Influence of the Viewpoints of Statesmen and Publicists, Frederick the Great, etc.

G. *Politics*—Economic Tendency in Modern Education.

Adapting Education to Political and Economic needs.

H. *Eclectic Tendency:*—Fusion of (1) Psychological, (2) Scientific, (3) Sociological Tendencies.

II. INDIAN.

A. *Ancient India.*—

Vedic Education: Mass Education. Buddhistic Education. Sankaracarya. Growth of Prakrit and decay of Mass Education.

B. *Muslim Education.*—

i. *In Urban centres only*—Influence of Hindu Learning.

ii. Work of Firozshah, Akbar, Aurangazeb.

C. *Western Influences.*—

1. Missionary efforts.
2. State aid and encouragement to Oriental Learning.
3. Demand for change: Period of Controversies (1800—1854). Raja Ram Mohan Roy. Elphinstone, Monroe, Perry, Macaulay, Wood's Despatch.

D. *Educational Policies*—

(i) *Primary and Mass Education*—Hunter Commission, District Local Board Acts (1882—1886), Hon. Gokhale's Demand in Central Legislative Councils, Primary Education Acts of various provinces, 1920 and after, the Hartog Report.

(ii) *Higher Education.*—The Sadler Report, The Hartog Report, The Lindsay Report, The Abbot and Wood Report.

E. *Recent Revivals and Experiments.*—

Gurukul, Sabarmati, Shantiniketan, Moga, Wardha Scheme, Vocational Education.

F. *Outlines of the History of Physical Education.*

G. *Outlines of the History of Vocational Education.*

APPENDIX XXI.

B.Sc. DEGREE EXAMINATION IN AGRICULTURE.

Syllabuses and Text-books.

AGRICULTURE—First Year.

(1) Development of Agriculture from early times.

(2) *Meteorology*:—The atmosphere—composition and properties.

Meteorological elements—Pressure, temperature, humidity, wind, clouds and precipitation, sunshine and evaporation, methods of observation and recording. Wind currents, trade winds, cyclones and depressions.

Monsoon Rainfall of the Presidency, influence of seasons on agricultural practices.

(3) *Soils*:—Properties of soil and sub-soil, study of soil profile—Main soil types of the Madras Presidency in relation to the cultivation of crops.

(4) *Tillage*:—Objects, methods and effects—preparation of land and seed beds.

(5) *Farm implements*:—Selection of types of ploughs and implements in relation to crop and soil. Relative advantages of improved iron and country ploughs. Indigenous implements in special tracts. Area covered by different implements; their economics. Methods of sowing mixed crops.

(6) *Irrigation*:—Importance of irrigation, sources, rivers, tanks, wells, catchment areas, major and minor irrigation works, productive and protective works. Different types of water lifts and their efficiency. Duty of water.

(7) *Practical*:—The student will undergo practical training in all branches of farm work. Every student will maintain a record book showing details of practical work done. These books will be valued in the examinations. Each student will personally cultivate a small unit of land.

AGRICULTURE—SECOND YEAR

(1) *Dry farming*:—Principles of dry farming. Rainfall, general climatic features. Nature of soils and crops grown. Methods of conservation of soil moisture, tillage, fallowing, sowing, inter-cultivation and harvesting. Implements for dry farming. Results of experiments conducted.

(2) *Soil Erosion*—Agents and extent of erosion. Methods of control. Results of experiments conducted.

(3) *Soil fertility and soil improvement*:-Drainage, soil alkalinity, reclamation by agricultural methods. Maintenance of fertility—fallows, manuring—growing of green manure crops.

(4) *Crops*:—Classification, cereals, pulses iucluding green manure crops, oil seeds, sugars, fibres, root crops, condiments, dyes, narcotics, etc. Cultivation and preparation of the above crops for the market. Season and period bound crops.

(5) *Fodder and Pastures*:—Methods of growing, types and value to cattle. Pastures—natural, artificial and their lay-out. Hay and silage making.

(6) Selection of seed, preservation, drying and methods of storage.

(7) *Manures*:—Principles of manuring different crops. Farm yard manure—different methods of preservation, sheep penning, night soil, poudrette, sewage, compost making, green manuring, silt, patti manure, oil cakes and fertilisers.

(8) *Experimental Agriculture*:—Objects, scope, lay out, and conduct of simple experiments. Beaven's half drill strip method, Randomised block and Latin square. Calculation of experimental error and interpretation of results.

(9) *Practical*:—The students will undergo practical training in all farm operations and in addition will personally cultivate a few important crops on a small unit of land allocated.

The practical record books and cultivation sheets maintained for crops cultivated by them will be valued in the examination.

HORTICULTURE.

I. *Fruit growing*.—

(*a*) Acreage, distribution and economic importance.

(*b*) Home-garden *vs*. commercial orchards.

(*c*) *Propagation.*

(1) Sexual and vegetative methods. Technique of propagation by cuttings, suckers, bulbs, layering, marcottage, budding and grafting. Top-working.

(2) Preparation and culture of seed and nursery beds.

(3) Separation and nursing of grafts.

(4) Relationship between rootstock and scion.

(5) Selection of rootstock and scion parents.

(*d*) Nomenclature and classification of South Indian fruits.

(*e*) Selection of sites—influence of climate, soil and exposure. Preparation of plan, lay-out, hedges; wind breaks, irrigation and drainage systems and digging pits. Level, contour and terrace, planting methods. Spacing between trees.

(*f*) Methods and seasons of planting. Age of trees for planting.

(*g*) Irrigation methods—basin, check, flood and furrow.

(*h*) Manurial practices; culture of inter and green manure crops.

(*i*) Orchard culture. Methods and seasons. Mulching.

(*j*) Training and pruning—shoot and root. Ringing, notching, smudging, deblossoming, thinning.

(*k*) Factors governing fruit set. Fruit shedding, and means of prevention.

(*l*) Picking, packing, grading, storage and preparation for market.

(*m*) Individual fruits. Mango, citrus, banana, sapota, guava, pomegranate, grape, pine apple, figs, annonaceus fruits, jak, papaya, melons, mangosteen, durian, litchi, bread fruit, apples, plums, pears, peaches, strawberries, zizyphus, cashewnut and minor fruits.

(*n*) Fruit products—canning, fruit beverages, dehydration, jams, jellies, marmalades, conserves and other by-products.

Practical work:—Practice in propagation methods and nursery and orchard operations. Identification of varieties and kinds.

II. *Vegetable growing*:—Kitchen gardening and commercial culture of vegetables.

Factors governing successful vegetable culture:—

Nomenclature and classification—Individual vegetables of economic value.

Companion and succession cropping systems.

Culture of seed beds and gardens.

By-products and preservation:—

Dehydration, canning, pickling and catsup.

Preparation for market.

Practical work:—Identification of varieties and kinds.

Practice in vegetable growing operations.

III. *Ornamental Gardening*:—Ornamental trees, shrubs, herbs, hedges, climbers, bedding and edging plants. Pot plants and pot culture.

Culture of important annuals for different seasons.

Economic flowers—jasmines, roses, chrysanthemums, Barbrias, artimesias.

Lawn making rockeries, arbors, topiary. Arboriculture.

Practical work:—Plans for a home garden, school garden and parks.

Identification of common ornamental plants, creepers, bushes and trees.

IV. *Spices*:—Cloves, nut-megs, cinnamon, allspice, cardamom, vanielle, pepper.

Practical work:—Identification of plants and products.

V. *Plantation and beverage crops*:—Coffee, tea, cocoa, cinchona, rubber, arecanuts, betelvine

Practical work:—Identification of plants and products.

AGRICULTURE—THIRD YEAR.

ANIMAL HUSBANDRY.

(1) *Breeding*:—Development of Science of Animal Husbandry. Methods of breeding—close breeding, line breeding, cross breeding, back crossing, grading and artificial insemination. Dual purpose

breed, popular beliefs—telegony, maternal impressions and nicking. Importance of sire and dam—Prepotency, pedigree and proved sire.

(2) *Cattle*:—Breeding tracts in the Presidency, their physical and climatic features. Breeds—Ongole, Kangayam, Amrit Mahal, Hallikar and Alambadi; their good points and economic importance. Reasons for degeneration of livestock and methods of improving livestock.

(3) *Buffaloes*:—Different breeds of the Presidency and their economic importance.

(4) *Sheep and Goats*:—Different breeds of the Presidency, their economic importance, points for successful breeding and rearing.

(5) *Feeding*:—General principles. Rations for different classes of stock.

(6) *Management*:—Points for observance, housing, etc.

(7) *Calf rearing*:—Different methods—natural and artificial. Feeding and management

(8) *Poultry*:—Different breeds introduced in the Presidency, their economic importance, breeding, rearing and feeding. Preservation of eggs—natural and artificial methods. Crosses and their economic importance.

DAIRYING.

(i) *Dairy farming* :—General Principles of Dairy farming. Economics of production and supply, housing and marketing of milk.

(ii) *Dairy Products* :—Preparation of butter by creamery and local methods, Dairy by-products, butter, ghee, skim milk, butter milk and their disposal.

(iii) *Milk* :—Effect of feed on quality, variations in quantity and quality due to species, breed, food, individuality, lactation, time of milking, age, portion of milk, condition of animal, season and climate.

Precautions to be taken in production of clean milk. Value of maintaining milk records.

FARM MANAGEMENT.

(i) *Farm Management*:—Location and laying out of farms—farm equipment, buildings, tools, implements, machinery, labour—human and animal, distribution and management. Systems of farming. Choice of type of farming. Cost of cultivation of crops, disposal of farm produce. Farm accounts.

(ii) *Farm costings of a few typical farms*:—Working out of—equipment, livestock, deadstock, cropping, rotation and profit and loss account of—(1) Dry land farms, (2) Wet land farms, (3) Garden land farms, (4) Mixed farms, (5) Dairy farms.

Practical work:—The students will answer the questionnaire issued and undergo training in the details of day to day management of farm and dairy. The practical record book will be valued in the examination.

ELEMENTARY AND AGRICULTURAL ECONOMICS.

1. *Elements of Economics* :—

(*a*) Definition : its aim and scope.

Economic activity ; want—effort and satisfaction.

Economic life and economic system.

Modern economic organisation—consumption, production, distribution and exchange.

(*b*) Consumption and demand. Want—standard of living and standard of comfort, standard of life.

Wealth: necessities, comforts and luxuries.

Utility—law of diminishing utility, marginal utility.

Demand—law of demand—elastic and non-elastic.

(*c*) Production and supply.

Modern production and its characteristics—Agents of production—land, labour, capital and entrepreneur.

Supply—law of supply—laws of increasing, constant and decreasing returns.

(*d*) Organization: Division of labour—specialization. Efficiency—forms of—organization—competition and combination—co-operative.

(*e*) Exchange: Market value and price. Theory of value.

Laws of supply and demand in a market—connected values.

Monopoly value.

(*f*) Mechanism of Exchange—money prices—credit—banks—Internal and external trade. Rate of exchange.

(*g*) Distribution—rent, interest, wages and profits.

(*h*) The state in relation to economic activity—Laissez faire and state of interference.

(In dealing with these special attention should be paid to Indian conditions both for illustration and application).

II. *Agricultural Economics*:—

(*a*) Agriculture as an Industry—its place in the economic system and its social and economic effects. The place of economics in modern agricultural and rural life, scope and meaning of agricultural economics. Rural reconstruction—village industries—Agricultural Associations. Better living societies, etc.

(*b*) Agricultural law and custom: Land tenures and laws. Land revenue system in the Madras Presidency. Madras Estates Land Act. Debt Relief Acts.

(*c*) Economics in Madras Presidency:—

1. Special study of the factors of production. Land, area, situation, law of diminishing returns, labour, its supply, efficiency and wages.

   Capital, forms of agricultural capital equipment.

   Agricultural credit—indebtedness—co-operative credit organisation and Government loans.

   Other credit facilities—Land Mortgage Banks, Takkavi loans, co-operative societies, etc.

2. Marketing problems and facilities. Organization in advanced countries like the Californian Fruit Growers' Exchange.

   Direct and co-operative in Marketing. Detailed study of the marketing of cotton, rice, groundnut, tobacco, fruits, other important products, etc., and transport facilities.

   Shandies, fairs, weekly and daily markets, cattle fairs.

   Regulated markets—Market Committees, grading, etc.

3. Co-operation. Co-operative movement in the province and its relation to agriculture. Principles of co-operation, organisation and working of co-operative societies—credit and non-credits.

Practical:—Enquiries into rural conditions in the Agriculture holdings in the neighbourhood of the college and during tours in the Presidency. Survey of villages and farmer's accounts, visit to Land Mortgage Banks, Co-operative Societies, Markets, etc., Library work—perusal of marketing reports, etc.

BOTANY—FIRST YEAR.

1. *Morphology and classification*:—The external morphology of the following parts:—

Root, Root systems: Modifications; stem parts, modifications, mode of branching; Bud—Development and structure; Leaf—structure, types, modifications; Flowers—parts, symmetry and modifications of parts, Inflorescence—types; Fruit—Structure, kinds, dehiscence and dispersal of seed; Seed-structure and germination of seed.

2. The general principles of classification and the distinguishing characteristics of the following families:—

Cruciferæ, Malvaceæ, Rutaceæ, Leguminosæ, Cucurbitaceæ, Rubiaceæ, Compositæ, Solanaceæ, Amarantaceæ, Euphorbiaceæ, Musaceæ, Palmaceæ, Gramineæ.

3. *Histology*:—Plant cell, its contents and structure. Internal structure of root, stem and leaf. Tissues, primary and secondary, their function and arrangement. Structure and development of anther and ovule. Pollination, fertilization and development of embryo.

Cell wall, its structure and modifications. Study of different tissues in plants—their development and adaptation to their function. Nucleus—nuclear division and chromosome treated in an elementary manner.

4. *Physiology*:—Absorption of water and gases and their movement in the plant. Photosynthesis and the synthesis of proteins. The essential and non-essential elements of plant food. Translocation and storage of food materials and their digestion. Enzymes and their action. Respiration. Sources of energy in plants. Special modes of nutrition. Growth, movement and irritability in plants. Reproduction.

5. *Practical work*:—Students will examine and describe plants of the families or groups specified in the syllabus, make dissection

and drawings of the various parts of plants and prepare sections for the microscope so as to illustrate their structure.

BOTANY—SECOND YEAR.

1. *Ecology*:—The distribution of plants and the factors which govern it. Flora of Madras—Salient features. Types of vegetation—Xerophytes, Mesophytes, Halophytes, Hydrophytes.

2. *Crop Botany*:-The cultivated plants and their origin. Differences between cultivated and wild plants. The important crops of India, their geographical zones and distribution. The morphology, histology and physiology of the more important South Indian crops and special physiology dealing with the following aspects:—(1) Foliar diagnosis, (2) Water absorption of crops in different stages of growth, (3) Factors influencing the season bound nature of crops, photo-periodism and vernalization. Diagnostic charactersitics of species and sub-species of each crop. Vegetative and sexual reproduction. Cross and self-fertilization. Sterility. Weeds—the most common and pernicious ones, indentification and principles of control. Seed testing—its principles and practice.

Practical work:—Refer crop plants to their families. Identification of the seeds of common crops and weeds—Prepare sections to illustrate the structure of crop plants and those of ecological interest.

BOTANY—THIRD YEAR.

1. *Genetics and Plant Breeding*:—Aim of genetics. Variation—kinds and causes. Theories of inheritance; the mechanism of inheritance; role of the chromosome, nature, distribution and function of genes. The work of Mendel; Mendelian ratios; later development of Mendelism. Polyploidy and Chromosome aberrations. Phenomena of linkage and crossing over.

Sex determination. Multiple, modifying and lethal factors. The contribution of genetics to the theory of evolution and plant breeding. The aim and scope of crop breeding, its relation to other agronomical work. Problems of crop breeding; economic production; breeding for special adaptations and uses. Breeding for pests, diseases and drought resistance.

Pure line theory:—Johannson's bean experiment. Definition of pure line. Stability of pure line; the application of the pure line idea in the breeding of cereals and fibres: outstanding accomplishments

in pure line breeding. Limitations of pure line; the place of hybridisation in crop breeding. Methods of study of quantitative characters; back crossing. Xenia. Study of F_1, F_2 and F_3 generations. Examples of accomplishment in each. Mutations and their place in crop breeding. Methods of inducing mutations. Chimeras and graft hybrids.

2. *Cryptogamic Botany*:—The main points of structure, development, life-history and the taxonomic relation of the following groups in general and the genera in particular:—

Cyanophyceæ (Blue-green algæ)	Gleocapsa, Oscillaria, Nostoc.
Chlorophyceæ (Green algæ)	Chlamydonas, Protococcus, Oedogenium, Spirogyra, Vaucheria, Chara.
Hepaticæ (Liverworts)	Marchantia.
Musci (Moses)	Polytrichum.
Pteridophytes	Selaginella, Adiantum, Marsilla

3. *Plant Pathology*:-A knowledge of the life-history and taxonomic relationships of the following:—

Cephaleuros, parasiticus, Rhizopus nigricans, Pythium aphanidermatum, Phytophthora arecæ, Cystopus sp., Solerospora graminicola, Saccharomyces, Phyllactinia corylea, Sphacelotheca sorghi, Puccinia graminis, Psalliota campestris, Ganoderma lucidum, Piricularia, oryzæ, Colletotrichum falcatum, Septoria sp., and Bacillus solanacearum.

The physiology of fungi, nutrition: carbon and nitrogen metabolism. The influence of environment, measurements of growth, factors influencing stimulation of growth and reproduction, staling, saltation, parasitism, enzymes, symbiosis; effect of parasite on host—to be treated in an elementary manner.

The principles of plant protection:—Exclusion, eradication, protection, immunisation. The preparation and use of fungicides for treating soils, seeds and plants. Principles and use of different types of spraying and dusting machinery.

A knowledge of the general characteristics of bacterial, virus, deficiency and non-parasitic diseases of plants. Symptoms, causes and

methods of control of important diseases of the following South Indian crops:—

Rice, Sorghum, Cumbu, Tenai, Ragi, Wheat, Sugarcane, Palms, Redgram, Groundnut, Castor, Cotton, Tobacco, Chillies, Potato, Turmeric, Ginger, Citrus, Grapes, Mango, Plantain and Coffee.

The principles of classification in fungi and bacteria.

4. *Practical:—*

In Genetics course candidates will be taken to the breeding stations and made to examine simple and complex Mendelian ratios.

Cryptogams:—They will make dissections of cryptogamic plants and drawings of the various parts and prepare sections for the microscope so as to illustrate their structure.

Mycology:—A knowledge of the methods of examination of specimens of diseases, preparation of culture media, isolation of organisms and inoculations. Koch's rules.

N.B.—At the practical examination each candidate must submit his laboratory note-book and a named collection of crop diseases, collected and preserved by himself.

CHEMISTRY—FIRST YEAR.

Organic Chemistry:–Isolation, purification and analysis of organic compounds. Determinations of molecular weights. Classification. Compound radicles. Open and closed chains. Saturated and unsaturated compounds. Homologous series. Empirical, molecular and constitutional formulae. Isomerism and polymerism. Hydro-carbons. Methane, Ethane, Ethylene and Acetylene.

Halides:—Methyl and Ethyl halides. Chloroform and iodoform.

Alcohols:—Monohydric alcohols. Methyl and Ethyl alcohols.

Ethers:—Sulphuric ether.

Aldehydes and Ketones. Acetaldehyde and Acetone.

Fatty acids:—Formic, acetic, propionic, and butyric acids.

Derivatives of acids:—Acetic anhydride, acetyle chloride, acetamide and amino acetic acid.

Esters:—Ethyl nitrite and nitrate. Nitro Ethane. Ethyl hydrogen sulphate. Esterification.

Ethyl amine.

Glycols:—Ethylene glycol and glycerol.

Dibasic acids:—Oxalic, malonic and succinic acids.

Hydroxy-acids:—Glycollic, lactic, malic, tartaric, citric.

Nitrogen derivatives:—Ethyl cyanide and urea.

Carbohydrates:—Glucose, levulose, sucrose, maltose, lactose, dextrin, starch and cellulose, preparation, properities, general reactions. (To be treated in an elementary manner.)

The aromatic compounds:—Benzene, chlorobenzene, Phenol, Benzaldehyde, Benzoic acid, Nitro benzene, Aniline and Salicylic acids.

Practical:—Reactions of bases and acids of common occurrence and of agricultural importance.

Qualitative analysis of mixtures of two bases and two acids.

Characteristic reactions of carbohydrates. Identification of the common organic acids—acetic, oxalic, formic, citric and tartaric.

CHEMISTRY—SECOND YEAR.

AGRICULTURAL CHEMISTRY.

Soils. Origin of soils. Rocks and rock-forming minerals met with in South India. Geological formations of South India. Weathering of rocks and soil formation. Soils derived from them. Different soil types of the Madras Presidency: Red, black, laterite, sandy, alluvial and peaty soils.

Proximate constituents of the soil—mineral matter, organic matter, soil moisture, and soil air.

Physical properties of soil: True and apparent. Specific gravity. Porespace. Internal surface. Plasticity, colour, shrinkage and expansion, structure and tilth.

Mechanical analysis of soil. Sedimentation methods—Beaker and pipette. Interpretation of results. Classification of soils according to texture. Flocculation and deflocculation. Absorptive properties of soil for bases and acids. Base Exchange. Lime requirement.

Soil organic matter. Origin and decomposition of organic matter. Estimation of soil organic matter. Humification; properties of humus. Carbon nitrogen ratio.

Relation of soil to water. Hygroscopic moisture, moisture holding capacity. Retention of water in moist soils; surface tension and

movement of water. Percolation and drain gauge. Evaporation. Transpiration. Wilting co-efficient.

Relation of soil to temperature. Factors affecting soil temperature.

Soil Air—Nature of the gases produced under aerobic and anaerobic conditions.

Soil reaction—Hydrogen-ion concentration and determination and significance of P.H. values of soils.

Alkaline and acid soils. Formation and methods of reclamation. Significance of sodium salts. Soda clays. Degree of Alkalinisation.

Irrigation waters. Composition and effect on soils.

Soil erosion: wind and water erosion. Methods of control.

Chemical analysis of soils:—Dormant and available plant food. Analysis of typical South Indian soils; interpretation of the results.

Soil surveys with special reference to Madras Presidency.

Biological action in soils. Break-down of carbo-hydrate and protein material in soils.—The carbon and nitrogen cycles.

Practical:—Volumetric analysis. Standard solutions. Acidimetry and alkalimetry.

Volumetric determinations involving the use of standard solutions of silver nitrate, permanganate, iodine and thiosulphate.

Gravimetric estimations. Fe, Al, SO_4, Cl, CaO, MgO, K_2O and P_2O_5.

Physical properties of soil.

CHEMISTRY—THIRD YEAR.

PLANT CHEMISTRY.

Plant materials. The ultimate composition of plants. The plant food elements. The value of different soil elements as plant foods. Functions of different plant food elements in plant growth.

Photosynthesis. Groups of organic compounds found in plants:—carbohydrates, cyano-genetic glucosides, tannins; formic, oxalic, malic, tartaric, and citric acids; fats, oils, waxes and lipoids; alkaloids, purine bases; uric acid, guanine, theobromine and caffeine; proteins. Their occurrence, general reactions and properties. Their physiological uses and biological significance.

Enzymes and their action.

Chemical changes occurring during germination and growth.

General composition of South Indian crops.

Manures:—Necessity for manures. Soil exhaustion. Minimum cropping value. Limiting factors. Classification of manures. The chief nitrogenous, phosphatic and potassic manures, their manufacture, application and modes of action. Farm yard manure, green manure, oil cakes. Analysis and valuation of manures. Importance of organic manures for South Indian soils.

Chemistry of foods and feeding:—Composition of the animal. Fodders and feeding-stuffs, their composition and analysis. Digestion and absorption. Functions of different nutrients. Digestive coefficients.

Nutritive ratios:—Calorific values. Starch equivalents. Formation of flesh, fat and milk.

Feeding standards. Calculation of rations. Manurial values of food. Vitamins.

Dairy Chemistry:—Composition and properties of milk and milk products, *viz.*, cream, skim milk, butter, butter milk, whey, cheese and ghee. Analysis and detection of adulteration. Bacteria in relation to the Dairy.

Practical:—Mechanical and chemical analysis of soils. Fixation of acids and bases.

Analysis of the more common crops of South India.

Analysis of manures, feeding stuffs and fodders.

Estimation of carbohydrates:—Glucose, sucrose, maltose, lactose and starch.

Hydrolysis by acids and enzymes.

Estimation of oils and fats.

Qualitative examination of the important vegetable and animal proteins.

Analysis of milk, skim milk and butter. Examination of water for irrigation purposes.

ZOOLOGY—FIRST YEAR.

Elementary Zoology:—(A course designed to give a general view of the animal kingdom, as an introduction to Agricultural Zoology.)

Theory:—The terms, Biology, Zoology and Botany. The chief characters of living organisms, animals and plants, their similarities and differences. Zoology—its scope—different aspects of study. The animal cell, its structure and functions. General organisation of animals with special emphasis on feeding, reproduction and development—Main classification.

The chief features of familiar and economic forms in Protozoa, Coelenterata, Annelida, Parasitic worms, Mollusca, Arthropoda and Chordata.

A detailed study of the class insects with reference to their structure, functions, development, life-history and habits and classification.

Practical:—Practical study of the main distinguishing features of Amoeba, Paramoecium, Hydro, Prawn, Spider, Butterfly, Snail and Fish.

Simple dissections of Earthworm, Cockroach, Frog, Pigeon and Rabbit.

Identification of economic forms of animals. Submission of laboratory note-books at the examination.

ZOOLOGY—SECOND YEAR.

AGRICULTURAL ZOOLOGY.

Theory:—The terms Agricultural Zoology and Entomology. Insects and their close allies. Insects and man. Popular and scientific classification of insects. Beneficial insects—Silk, Lac, Honey insects, Pollinators, Parasites and Predators.

Injurious insects—Pests, major and minor. Factors governing their increase and decrease.

Methods of insect control. Cultural and mechanical methods. Insecticidal methods—spraying, dusting and fumigation; biological methods; legislation in insect control. Important pests affecting cattle and stored products. Household pests and disease carriers.

The important pests of cultivated plants such as cereals, pulses, oil-seeds, fibre crops, fruit trees, vegetables, palms, dyes, drugs and narcotics, garden plants and avenue trees.

Other animals of agricultural importance such as eelworms, ticks, mites, millipedes, crabs, snails among lower animals and birds, rats, jackals and wild pigs among higher animals.

Practical:—Practical study of the external characters and mouth parts of important types of insects. Simple dissections of grasshopper, cockroach and beetle. Identification of insects of economic importance. Preparation of common insecticides and handling of appliances such as sprayers and dusters.

Observation and rearing of common insects. Submission of a representative collection of insects and field records at the examination.

AGRICULTURAL ENGINEERING—FIRST YEAR.

Mensuration and Trigonometry:—Area and volumes of simple plane figures. Simpson's Rules. Trigonometrical ratios and use of logarithms.

Elementary Surveying:—Chain survey, plane table survey, Prismatic compass, traverse and plotting.

Building:—Building materials used in the construction of simple farm buildings. Stones, bricks, limes, cements, mortars and concretes. Timbers, paints and varnishes. Wood work wrought and put up in roof timbers and in doors and windows. Chemical methods of preservation. Roofing, plastering and flooring. Trial pits, masonry and concrete foundations, superstructure.

Drawing and estimating:—Drawing plans of simple farm buildings, culverts, etc., from specification and estimating quantities and cost including detailed data. Drawing and sketching of simple machine parts.

Hydraulics:—Wells and well sinking. Boring.

Water lifts, picottah, mhote, Archimedian screw, Persian wheel pumps, adaptability and installation.

Agricultural implements:—Characters and strength of materials used in the construction of agricultural implements. The general principles in the construction of agricultural implements and machinery; ploughs, harrows, drills, presses, chaffcutters, cane-crushing mill, sprayers, milk separator, clod crushers, rollers and butter churns.

Practical:—Lectures on the above portions will be supplemented by practical work in surveying, levelling and simple plan drawing and estimating. Workshop practice in carpentry, smithy and fitting.

AGRICULTUAL ENGINEERING—SECOND YEAR.

Levelling:—Instruments employed, their adjustments and uses. Field book plotting. Easy computation of earth work. Levelling implements.

Road making:—Preliminary surveying and mapping alignment, Longitudinal and cross sections, gradients and formation. Earth, gravel and metal roads, maintenance and repairs. Earth graders.

Power on the farm.—Work, energy and power. Sources, man, animal, wind and flow of water, steam and oil engines. Farm lighting and general uses of electric current for agricultural purposes. Efficiency, fuel and their calorific value.

Internal combustion engines, gas, petrol and oil engines. Principles underlying construction and working, methods of ignition, governing. Engine faults, location. Measuring B.H.P. and I.H.P. power-driven farm machinery. Disintegrators, decorticators, rice hullers, gins, tractors, steam boilers, grinders. Soil conservation and erosion control-practices and appliances.

Practical—Lectures will be supplemented by practical work in levelling, drawing, and estimating of culverts, handling and practical work in farm machinery, engines, implements and tractors, sugarcane mills and other machines.

ANIMAL HYGIENE—FIRST YEAR.

Theoretical:—Introduction and definition of common terms. Skeleton of ox. Appendicular skeleton—bones of limbs and their media of attachment; axial skeleton. Important bones of the skull, vertebrae, ribs and breast bones (to be treated in an elementary manner). Elementary anatomy and physiology of the digestive, respiratory, circulatory and urinogenital system of ruminants.

Meteria medica of easily obtainable drugs. The origin, uses and doses for ruminants of the following drugs:—

Pot. Nitras, Pot. Permanganas, Sodii bicarb, Sodii chloride, Ammon. Carb., Ammon. Chlor., Creta prp., Mag. sulphas, Alum, Cupri. Sulphas, Ferri. Sulphas, Zinc oxide, Tincture of Iodine, Sulphur, Borax, Boric acid, Acid Carbolic, Phenyle (cresol or izal), Tar, Paraffin, Tobacco, Nux vomica, Chiretta, Anise, Ginger, Ol. Eucalyptus, Ol. Terebenthene, Camphor, Asafœtida, Mustard, Ol. Recine, Ol. Lini, Catechu, Treacle, Gum, Acacia, Omum, Butea seeds, Sweet flag, Neem Oil, Ol. Arachis, Arrack.

Minor surgery. Description and treatment of inflammation, operations of castration, treatment of wounds, fractures, dislocation, ulcers, abscesses, sprains and pricked foot.

Practical:—Handling of cattle, Methods of restraint, Signs of health and disease. Taking temperature and pulse. Dentition in ruminants.

Simple surgical operation such as bandaging, dressing and suturing simple wounds, taking blood smears, etc.

ANIMAL HYGIENE—SECOND YEAR.

Theoretical:—General hygiene including construction of cattle sheds, lambing pens, ventilation, drainage, disinfection, nursing and feeding of sick animals and disposal of their excreta and carcasses.

Diagnosis and treatment of common ailments in cattle—fevers, constipation, diarrhœa, dysentery, hoven, choking, abortion, retention of placenta, garget, obstruction to teat and cattle poisoning practices.

Contagious diseases:—Their causes, symptoms, prevention and cure, rinderpest, hæmorrhagic septicæmia, anthrax, black quarter, sheep-pox, tuberculosis, liverrot, gid, mange, ringworm, foot and mouth disease.

Management and common diseases of poultry.

Practical:—Dispensing. Principles of shoeing, diagnosis and treatment of lameness in cattle. First-aid in parturition cases.

List of Text-books and Reference Books.

AGRICULTURE.

(A) FIRST EXAMINATION.

Text-book—

A Short Course in Elementary Meteorology, Pick, W. H., 1927.

Reference Books—

1. Climatology, Miller, A.A., 1931.
2. Forecasting Weather, Shaw, W. N., 1911.
3. Agricultural Geology, Rastall, R.H., 1922.
4. A Summary of the Geology of India, Vredenberg, E. W., 1907.
5. Farm Implements and Machinery, Bond, J. R., 1925.

(B) SECOND EXAMINATION.

Text-books—

1. Use of Water in Irrigation, Fortier, S., 1926.
2. Agriculture—Theoretical and Practical, Wrightson, J. and Newsham, J. C., 1919.
3. The Tropical Crops, Barrett, O. W., 1928.

Reference Books—

1. Theory and Practice of Fertilisers, Bear, F. G., 1929.
2. Irrigation and Drainage, King, F. H., 1918.
3. Irrigation Practices and Engineering, Etcheverry, Volumes I—III.
4. Dry Farming, Widtsoe, J.A., 1921.
5. A. Text-book of Tropical Agriculture, Nicholls, H. A. A., 1929.

(C) FINAL EXAMINATION.

Text-books—

1. Animal Genetics, Crew, F. A. E., 1925.
2. The Science of Dairying, Penlington, W. A. G., 1927.
3. Introduction to the Study of Indian Economics, Kale, V. G., 1927.

Reference Books—

1. Principles of Breeding, Davenport, E., 1912.
2. Outlines of Agricultural Economics, Nourse, E. G., 1927.
3. Madras Manual of Administration, Volume I.
4. Co-operation in India, Wolf, H. W., 1919.
5. A First Course in Statistical Methods, Gavett, E. J., 1920.

BOTANY.

Text-Books—

1. Handbook of Botany for India by K. Rangachari. P. Varadachari & Co., Madras.
2. Strasburger's Text-book on Botany, 6th English Edition, 1930. Macmillan & Co.
3. Genetics by Walter.

4. Botany of Crop Plants by W. W. Robbins. P. Blackiston, Philadelphia.

5. Fungi and Diseases in Plants by E. J. Butter. Thacker Spink Ltd., Calcutta.

6. Principles and Problems of Botany by Sinnot.

Reference Books:—

1. Structural Botany by D. H. Scott, Vol. I.—Flowering Plants. Vol. II.—Flowerless Plants. A. & C. Black, London.

2. Principles of Genetics by E. W. Sinnot & Dunn. McGraw-Hill Book Co., New York.

3. Fungi and Plant Diseases by Bennett. Macmillan & Co.

4. Manual of Fungus Diseases by Heald. McGraw-Hill Book Co., New York.

5. A Handbook of some South Indian Weeds by C. Tadulingam. Government Press, Madras.

6. Recent Advances in Plant Breeding by H. Hunter & H. M. Leake. J. A. Churchill, London.

7. Text-book of Plant Pathology by C. E. Owens. John Wiley & Sons, Incorporated in New York.

8. Handbook of Indian Botany, Rangachari, III Edition, revised by S.N. Chandrasekhara Ayyar. P. Varadachari & Co., Madras.

CHEMISTRY.

A. Organic Chemistry.

Text-books:—

1. Theoretical Organic Chemistry by J. B. Cohen. Messrs. Macmillan & Co., London.

2. Organic Chemistry by W. H. Perkin and F. S. Kipping. Chambers, Ltd., London.

Reference Books:—

1. Text-book of Organic Chemistry by Holleman and Walker. Chapman & Hall, Ltd., London.

2. Organic Chemistry for Advanced Students by J. B. Cohen, Part I—Reaction; Part II—Structure; Part III—Synthesis. Edward Arnold & Co., London.

3. Recent Advances in Organic Chemistry by A. W. Stewart. Longmans, Green & Co., London.

B. Practical and Analytical Chemistry.

Text-Book—

Systematic Qualitative Analysis by Caven. Blackie & Son, Ltd., London.

Reference Books—

1. A Treatise on Practical Chemistry and Quantitative Analysis by Clowes and Coleman. J. & A. Churchill, London.
2. Quantitative Chemical Analysis by Clowes and Coleman. J. & A. Churchill, London.

SOILS.

Text-Book—

Manual of Agricultural Chemistry by Ingle. Scott, Greenwood & Sons, London.

Reference Books—

1. The Physical Properties of the Soil by B.A. Keen. Longmans, Green & Co., London.
2. Soils, their origin and classification—an introduction to Pedology by Robinson. W. Heffer & Sons, Ltd., Cambridge.
3. Soil conditions and plant growth by E. J. Russell, 5th Edition. Longmans, Green & Co., London.
4. Text-book of Agricultural Bacteriology by Lohnis and Fred. McGraw-Hill Book Company, New York.
5. Soil Erosions (Government Press, Madras).

MANURES.

Text-Book—

Fertilisers and Manures by A. D. Hall. J. Murray, London.

Reference Book—

Manures and Fertilisers by Wheeler. Macmillian & Co., New York.

PLANT CHEMISTRY.

Text-Book—

Chemistry of Plant Life by Thatcher. McGraw-Hill Book Company, New York.

Reference Books—

1. Introduction to the Chemistry of plant products by Haas and Hill—Volume I and Volume II. Longmans, Green & Co., London.
2. Plant Physiological Chemistry by Harvey. Century & Co., London.

ANIMAL CHEMISTRY.

Text-Book—

Animal Nutrition by T. B. Wood.

Reference Books—

1. Nutrition of Farm Animals by Armsby. Macmillan & Co., Ltd., London.
2. The Principles of Animal Nutrition by Armsby.
3. The Chemistry of Cattle Feeding and Dairying by G.A. Murray. Longmans, Green & Co., London.

DAIRY CHEMISTRY.

Text-Book—

Text-book of Dairy Chemistry by E. R. Ling. Chapman & Hall Ltd., London.

Reference Books—

1. Dairy Chemistry by H. D. Richmond, Griffin & Co., Ltd., London.
2. Dairy Bacteriology by Orla Jensen. J. & A. Churchill, Ltd., London.

ZOOLOGY.

Reference Books—

1. Some South Indian Insects by Fletcher.
2. Zoology for Indian Students by Parker and Bhatia. Macmillan & Co., London.
3. Report of the Proceedings of the Entomological Meeting at Pusa, 2nd, 3rd, 4th and 5th.
4. Annotated List of the Insects affecting the important Cultivated Plants in South India, Madras Agricultural Department Bulletin No. 27 (New Series) by Dr. T. V. Ramakrishna Ayyar.

5. Indian Insect Life by Lefroy.
6. Handbook of Economic Entomology for South India by Dr. T. V. Ramakrishna Ayyar.

ENGINEERING (MECHANICAL).

Text-Books—

1. A Laboratory Manual of Farm Machinery by Frederick A. Wirt, Kansa State Agricultural College. Ross & Co., Mylapore, Madras.
2. Farm Motors by Andrew A. Potter, Purdue University Agricultural Engineering Series. Ross & Co., Mylapore, Madras.

Reference Books—

1. Electro Farming by R. Borlase Mathews, A.M.I.C.E. B. T. Batsford Ltd., London.
2. Sugar Machinery by Walls Tayler, A.M.I.C.E. B. T. Batsford Ltd., London.
3. A Text-book of Applied Hydraulics by Addison. H. Chapman and Hall.
4. Farm Machines by W.H. Maxwell. Volume I (1934) (compiled by the Institute for Agricultural Research in Engineering). Oxford University Press.

ENGINEERING (CIVIL).

Text-Books—

1. Agricultural Surveying including Mensuration, Road Constuction and Drainage by John Malcolm. Tutorial Press.
2. Notes on Building Materials for Indian Students by K. Narayana Ayyangar of Madras Engineering Service. Wesleyan Misson Press, Mysore.
3. Notes on Building Construction for Indian Students by K. Narayana Ayyangar. Higginbothams, Madras.

Reference Books—

1. Agricultural Engineering by Davidson. Webb Publishing Co., Minnesota, U.S.A.
2. Hydraulics by Col. H. D. Love. Higginbothams, Madras.
3. Building Construction and Drawing by E. F. Mitchell & G. A. Mitchell—Elementary Course, Part I. B. T. Batsford Ltd., London.

4. Text-book on Estimating by J. Schoury (College of Engineering Manual), 4th reprint Text and Plates. Government Press, Madras.

5. Hints on Estimating.

ANIMAL HYGIENE.

Text-Book—

1. Some Diseases of Cattle in India for Stock Owners. Higginbothams, Madras.

2. Bailleres Atlas of the Ox. Its Anatomy and Physiology. Baillere Tindal & Co., London.

3. Veterinary Pharmacopea of Bazaar Drugs by J. D. E. Holmes. Higginbothams, Madras.

Reference Books—

1. Principles of Veterinary Science by F. B. Hadley. W. B. Saunders & Co., London.

2. Diseases of Animals in Tropical Countries by Edmonds and Walker. Baillere Tindall & Co., London.

3. Physiology of Farm Animals by F. H. A. Marshall and E. Hallen. Cambridge University Press, London.

4. Veterinary Therapeutics by Wallis Hoare. William Wood & Co., New York.

5. Poultry Diseases by Kaupp. Baillere Tindall & Co., London.

Books common to Agriculture and Chemistry:

1. The Soil by A. D. Hall, 1932.

2 Soil Physics and Management by T. G. Mosier and A. A. Gustafson, 1925.

3. Fertilisers and Crops by L. L. Vanslyke, 1927.

4. Principles and Practice of Green Manuring by A. A. Pieters, 1927.

5. Feeds and Feeding by W. A. Henry and F. B. Morrison, 1928.

6. Animal Nutrition by T. B. Wood, 1927.

7. Scientific Feeding of Animals by O. Kellner, 1920.

Book common to Agriculture, Chemistry and Veterinary Science:

Animal Nutrition and Veterinary Dietetics by R. G. Linton, 1927.

Book common to Agriculture and Engineering:

Farm Machinery by A. Stone, 1928.

APPENDIX XXII.

B.V.Sc. DEGREE EXAMINATION.

SYLLABUSES

BIOLOGY

The course consists of lectures, demonstrations and practical work having not less than 110 hours for the former and 100 hours for the latter.

A. General Biology

The distinctive properties of living and non-living matter—the difference between plants and animals—the nature and properties of protoplasm—the structure of the cell, cell division.

B. Botany

1. *General morphology.*—(*a*) The vegetative organs of a flowering plant; root, stem and leaf. The morphology and modifications of roots and stems. Buds and branching. Parts of a leaf; different kinds of leaves; venation, simple and compound leaves; arrangement of leaves on the stem; modifications of leaves.

(*b*) Inflorescence—definite and indefinite—the distinctive characters of the following kinds—raceme, corymb, spike, spadix, panicle, umbel, capitulum, cyme. Bracts. The flower—parts of a flower—thalamus, calyx, corola, androecium, gynoecium—symmetry of the flower—the structure of the ovule—pollination and fertilisation. The fruit—kinds of fruits—the seed and its germination. Dispersal of fruits and seeds.

2. * *Histology.*—The plant tissues—epidermal, fundamental and vascular. The histology of root, stem and leaf. Growth in thickness of root and stem.

3. *Physiology.*—The composition of plants—essential mineral substances—water cultures—gaseous and liquid absorption. Transpiration. Photosynthesis. Destructive metabolism; respiration. Simple movements in plants. Exceptional modes of nutrition. Rotation of crops.

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* Including only such of the microscopic structure of plant organs as is necessary for the understanding of their functions.

4. *Ecology.*—The external relations of plants. Growth forms of plants—herbs, shrubs and trees—Xerophytes, mesophytes, halophytes, parasites and saprophytes.

5. *Classification.*—The distinctive characters of phanerogams—the dicotyledons, monocotyledons and the gymnosperms. The characters of the following families—Coniferae, Graminae, Liliaceae, Ranunculaceae, Papaveraceae, Cruciferae, Rosaceae, Leguminosae, Umbelliferae, Solanaceae, Labiate, Scrophulariaceae and Compositae.

Elementary facts regarding the typical life-histories of ferns, mosses, algae, fungi and bacteria.

Practical work in the laboratory includes the dissection of flowers and fruits and the examination and identification of microscopical preparations relating to the plants enumerated above.

C. Zoology.

1. *Phylum Protozoa.*—General features. The structure and life-history of Amoeba, Paramecium, Euglena or other flagellate. Trypanosoma, Haemamoeba, Piroplasma and Coccidium.

2. *Phylum Coelenterata.*—General features. Hydra.

3. *Phylum Platyhelminthes.*—General features. Structure and life-history of Fasciola (Distomum), Schistosoma (main features only), Taenia, Taenia echinococcus (main features only).

4. *Phylum Nemathelminthes* (nematoda)—General features. Ascaris and Trichinella.

5. *Phylum Annelida.*—General features. Earthworm ; Leech (main features only).

6. *Phylum Arthropoda.*—General features. Distinguishing characters of the Crustacea, Myriapoda, Insecta and Arachnida. Structure of the Cockroach as a type of the Insecta. Insect metamorphosis. Characters of the Orthoptera ; Diptera ; Siphonaptera ; Hemiptera (Rhynchota). General structure and life-history of Ticks and Mange mites.

7. *Phylum Mollusca.*—General features.

8. *Phylum Echinodermata.*—General features.

9. *Phylum Chordata.*

1. Cephalochorda. Elementary facts regarding the structure of Amphioxus, Biolgossus and Ascidian.

2. Craniata. Main morphological features.

(*a*) Pisces, Description of a shark. General characters of elasmobranchi, teleostei, and dipnoi.

(*b*) Amphibia. Structure and life-history of the frog (main features only).

(*c*) Reptilia, General Features. External characters of lizard, snake, tortoise and crocodile.

(*d*) Aves. General features of birds with special reference to feathers, wings, leg and respiratory organs.

(*e*) Mammalia. General features. Distinguishing characters of the monotremata, marsupialia, cetacea, ungulata, carnivora, rodentia and primates.

D. Outlines of the theories of Organic Evolution treated in an elementary manner.

Practical.—Candidates are expected to examine and identify microscopical preparations connected with the foregoing syllabus. They will also be required to make simple dissections of the following types :—Earthworm ; Leech ; Prawn and Crab (external characters) ; Cockroach ; Centipede, Millipede and Scorpion (external characters) ; Fresh water Mussel (external characters); Starfish (external characters); Amphioxus (preparations and sections); Shark (external characters) : Frog ; Lizard and snake (external characters) ; Pigeon (external characters). Dissections of the nerves in the Frog will not be required.

Text-Books:

1. Elementary Text-book of Zoology for Indian Students (Macmillan) by Bhatia, B.L.

2. Text-book of Biology (University Tutorial Press) by Spratt, E. R. and Spratt, A. V.

3. A Class-book of Botany (Oxford University Press) by Dutta, A. C.

4. Outlines of Zoology by M. Ekambaranatha Ayyar published by S. Visvanathan.

Reference books:

1. Zoology for Medical Students (Macmillan) by Graham Kerr, J. G.

2. Biology for Medical Students (Macmillan) by Hentschel, C. C., and Cook, W.R.I.

3. Text-book of Botany (University Tutorial Press) by Lowson and Sahni, B.

4. Organic Evolution (Macmillan) by Lull, R. S.

5. Elementary Biology (Macmillan) by Parker, T. J.

6. Text-book of Zoology, two volumes (Macmillan) by Parker and Haswell.

7. Manual of Botany for India (Government Press, Madras) by Rangachari, K.

CHEMISTRY

The course shall consist of lectures and practical work, having not less than 110 hours for the former and 100 hours for the latter.

A detailed study of the portions below will be covered and the student will be taught general principles of Volumetric analysis.

1. Inorganic Chemistry:

Definition—compounds and elements—mechanical mixture and chemical compound.

Atoms—molecules—atomic weight, symbols, formulae and equations.

Fire—combustion, oxidation—flame—Production of heat in chemical change.

Air—composition—air a mixture—uses of the various gases—action of plants and animals.

Water—composition—electrolysis of water—volumetric and gravimetric composition—solution and crystallisation—water of crystallisation—suspended and dissolved impurities—filtration—decantation—distillation—hard and soft water—permanent and temporary hardness—rain water—sea water—spring water and surface well water.

Earth—classification of compounds and elements—Oxides—hydroxides—Alkalies—acids—salts—normal, basic and acid salts.

Non-metals—preparation—properties and tests for oxygen—hydrogen—nitrogen—ammonia—nitric acid.

Carbon—varieties—charcoal—graphite—diamond—coal. Distillation of coal—coal gas manufacture—uses—Bunsen's burner—Davy's safety lamp.

The Halogens—chlorine—hydrochloric acid—bromine—Iodine—fluorine.

Sulphur—different varieties—hydrogen sulphide—Oxides of sulphur—sulphuric acid.

Phosphorus—red and yellow.

Silicon.

Metals—occurrence—preparations—properties and uses of the more important salts used in medicine.

2. Physical Chemistry.

Boyle's and Charles' law of gases—properties of gases and liquids—solubility of a gas in a liquid—surface tension.

Solution—Osmotic pressure—Electrolysis and the existence of ions in solution—Hydrogen-ion concentration and pH values.

Colloidal solutions—preparation and properties.

Catalysis—Catalytic reactions.

3. Organic Chemistry.

Hydrocarbons—paraffins—Olefines-Acetylene-Homologous series.

Alcohols—different Varieties—chloroform—carbon tetrachloride—iodoform.

Aldehydes — Ketones — Acids — Esters — Ethers — Amines— and amides in general and the preparations and characteristics of the more common of these and their commoner derivatives.

Fats—oils—soaps—Glycerine, etc.

Carbohydrates—starch—cellulose—sugars, etc.

Fermentations—alcoholic—acetic—lactic—butyric.

Amino acids—cyanides—urea.

Distillation of wood and coal.

Aromatic compounds—Benzene and its chief derivatives—General properties and reactions of albumin—glucosides—alkaloids—turpentine—camphor. Ultimate analysis of organic compounds.

Practical.

Inorganic.—

Students will be expected to be familiar with the ordinary materials and apparatus used in laboratories with such operations as filtration, solution, distillation, etc.

to be familiar with the use of a chemical balance, graduated flasks, pipettes and burettes,

to prepare simple inorganic substances,

to perform simple quantitative exercises such as determination of melting points, boiling points: densities, and the determination of the amount of water in substance or of the amount of ash left on the ignition of a substance,

to prepare and to use in simple volumetric estimation standard solutions of acids, alkalis, etc.,

to determine the approximate hydrogen-ion concentration of a given solution by means of indicators.

Organic.—

Detection of the following elements.—Carbon—hydrogen—nitrogen—sulphur—phosphorus.

Preparation of chloroform and iodoform from ethyl alcohol.

Tests for ethyl alcohol, glucose, cane sugar, phenol, salicylic acid, acetic acid, oxalic acid, Hydro-cyanic acid, tartaric acid, citric acid and urea.

The preparation of fatty acid from fat.

ANATOMY

PART I

The course shall consist of lectures and practical work having not less than 60 hours for the former and 100 hours for the latter including Histology.

Note.—For descriptive purposes, the Ox will be taken as the type and the important comparative features of the horse, dog and fowl will also be given.

Osteology.

Vertebrata.—Classification, characters of the aves and mammals; bones—physical properties, chemical composition—classification—contents of bone—coverings of bone—macroscopic and microscopic description of the osseous tissue—development of bone—descriptive terms.

Arthrology.

Cartilage.—Classification; ligaments, synovial membranes; kinds of motions in joints; structure of a joint—description of all the joints in the body.

Histology.

Microscope.—Various parts—care and cleanliness—handling of microscope; examination of different extraneous objects likely to be confounded with in the microscopic examination. Animal cell—description. Blood and its contents—examination of fresh blood of mammals and fowl.

Common histological stains employed.—Preparation, staining and examination of blood films of mammals and fowl.

Elementary tissues.—Preparation and examination of epithelial, connective, muscular and nervous tissues.

Histological technique.—

The sections of the following organs will be examined and studied: Large artery, small artery, vein; tongue, salivary glands, œsophagus, rumen, reticulum; Dog's stomach—cardiac and pyloric extremities; duodenum, jejunum, ileum, large intestine; Liver-dog, gall-bladder, liver-pig, pancreas, trachea, lungs, kidney, ureter, bladder, urethra; penis, testicle, prostate; ovary, oviduct, uterus, mammary gland, skin, spleen, adrenal, thymus, thyroid, pituitary; lymphatic gland, spinal cord, cerebrum, cerebellum, sense organs, tongue and olfactory part of the nasal mucous membrane.

PHYSIOLOGY

Part I

The course shall consist of lectures and practical work having not less than 90 hours for the former and 30 hours for the latter.

The structrural basis of the body.—The cell—Vital phenomena of the cells—structure of the cell—Physical structure of protoplasm—the surface layer of the cell—Histological differentiation of cells.

The Physico Chemical Basis of Physiological Phenomena.

The energy of molecules in solution—Diffusion—Osmosis—Osmotic pressure—'Normal' physiological solutions. Neutrality and reaction—'Buffer' systems—Hydrogen-ion concentration. Properties of colloids. Membrane permeability—membrane equilibria.

Blood.

General Structure—Reaction of blood and its regulation—Specific gravity—R.B.Cs., W.B.Cs. and plateletes, their origin, life-history and functions—Hæmoglobin—Hæmolysis—Plasma proteins—their origin and functions—coagulation of blood—Amount of blood in the body of various animals—Methods of determination of the amount of blood.

Lymph.

Formation—Lymphatic vessels and gland—functions of lymphatic system—chyle.

Cerebrospinal Fluid.

Meninges and cerebrospinal pathway—Formation of cerebrospinal fluid—functions.

Circulation.

Physiological anatomy of the heart—action of valves—mechanism of heart pump—Rhythmicity and conduction in the heart—Electrical changes, Electrocardiogram—Apex beat—Heart sounds—Cardiac cycle—Ventricular output and the volume of the circulation—Stroke volume and minute volume—Intrinsic regulation of the stroke volume—coronory circulation.

The cause of heart beat—Myogenic and Neurogenic theories—Action of ions—Properties of cardiac muscles.

The nervous regulation of heart—the efferent and afferent cardiac nerves—cardiac reflexes—chemical regulation of the heart. The effect of temperature—Heart rate in different animals - some cardiac irregularities, heart-block, fibrillation.

Flow of blood—blood velocity—Blood pressure—Methods of determining blood pressure—Systolic, diastolic and mean arterial pressures—venous pressure - effect of gravity on blood pressure—production of blood pressure—pulmonary circulation.

Arterial pulse—Velocity of pulse—Nature of pulse in health and disease—Diognostic importance—Venous pulse.

Vaso-motor mechanisms—Nervous control of arterioles—Vaso-constrictor and Vaso-dilator nerves—origin and distribution and mode of action—Vaso-motor reflexes—Chemical control of arterioles—Control of the capillaries—Shock, primary and secondary; causes and remedial measures.

Respiration.

The respiratory apparatus—the mechanics of respiratory movements—Abdominal and costal types of breathing and their significance—Volume of air respired—Pneumothorax—Respiratory rate. Respiratory centre—chemical and nervous regulation—chemistry of respiration—Principle of ventilation.

The gases of the blood—the transport of blood gases—Dissociation curves of haemoglobin and Carbon dioxide—Chloride shift. Effects of altered oxygen pressure.

Respiration in health and disease—Respiratory sounds and their diagnostic value.

Production of sounds—special respiratory acts, such as, neighing, bellowing, coughing, etc.

Digestion and Absorption.

Chemistry of foods—Proteins, fats and carbohydrates, vitamins, inorganic salts and water.

Catalytic and enzyme action—enzymes as catalysers—Activation of enzymes—co-enzymes—types of chemical changes brought about by enzymes.

The alimentary canal in different animals—prehension, mastication and deglutition.

Digestion of food in carnivora, omnivora and herbivora—salivary glands and their secretion—regulation of salivary secretion—composition and functions of saliva—occurrences of ptyalin in domestic animals—Digestion in the simple stomach. Gastric glands—gastric juice—composition and actions of gastric juice—Control of gastric secretion—other bio-chemical processes in the stomach such as cellulose digestion.

Digestion in the ruminant's stomach—Anatomy of the ruminant's stomach—Rumination—Chemical changes in the rumen—Mechanical factors.

Digestion in the small intestine—Pancreas and its secretion-Composition and action—control of secretion—secretion—its nature, distribution and action—Intestinal juice—glands of the intestines—composition and actions of intestinal juice—Regulation of intestinal secretion—Bile—composition and functions—its secretion. Bacterial processes in the small intestines.

Digestion in the large intestines—The large intestine of carnivores—form and structure—secretion—bacterial action. Large intestine of herbivores—form, structure and secretion—digestive processes.

Digestability and digestion co-efficient—faeces.

Movement of stomach and intestines:—

Kinds of stomach movements—regulation—Hunger contractions—thirst—vomiting.

Intestinal movements—Pendular movements. Rhythmic contractions, Peristaltic rushes—Anti-peristalsis—Movements of large intestines—control of intestinal movements. Rate of passage of food—defecation.

Absorption: Channels of absorption—absorptive surfaces—mechanism of absorption. Absorption of fat, proteins and carbohydrates.

Metabolism and Heat Regulation.

The exchange of matter and energy—calorimetry—indirect and direct—Respiratory quotient—Basal metabolism—factors influencing metabolic rate.

Protein metabolism—deamination and urea formation—Amino acids—work and protein metabolism.

Fat metabolism—Stored fat and tissue fat—formation of fat from carbohydrate and protein—Fat mobilisation and oxidation—ketosis.

Carbohydrate metabolism—Glycogen—Blood sugar—Regulation of carbohydrate metabolism—Insulin—Hyperglycæmia and glycosuria—Diabetes.

Importance of minerals—Water—Vitamins, results of deficiency.

Heat regulation—seat of heat production—body heat and its regulation—fever.

Excretion.

Kidney—structure—mechanism of renal secretion—Factors influencing renal secretion—Micturition—Nervous control of the bladder.

Urine—Composition and character of urine of different Animals—Urine in health and disease—Diagnostic importance of urine examination.

Skin and its functions—Glands of the skin.

Practical (Biochemistry).

Technique of the determination of the hydrogen-ion concentration of fluids.

General reactions of *carbohydrates*, proteins and fats.

Estimation of sugars.

Practical study of the action of the various enzymes on food-stuffs.

Milk—study of physical characters—Estimation of fat, lactose and inorganic constituents. Action of Rennin on Milk.

Blood—Study of the characters and composition of blood. Testing for blood in suspected materials.

Bile—Tests for bile salts and bile pigments.

Urine—Study of physical character and chemical composition.

ANIMAL HUSBANDRY.

PART I.

(HANDLING AND SHOEING)

The course shall consist of lectures, demonstrations and practical work having not less than 120 hours.

How to approach a horse—how to make a horse move over—how to lift up a fore limb—how to lift up a hind limb—how to hold up a fore limb—how to hold up a hind limb—how to hold a horse—how to lead a horse—how to lead a horse into and out of a stable—how to turn a horse—how to back a horse—how to trot a horse in hand—different methods of securing a horse in the stable.

Means of controlling horses—Blinds—Twitch—Muzzle—cradle—side rod—tying up a fore limb—The trevis—casting by double side line—casting by hobbles—use of cross hobbles—releasing limbs from hobbles and securing—securing horse on back—hobbling mares for covering—lifting up a fallen horse.

Means of controlling oxen—bull holder—nose ring—holding by the nose—securing hind limb by aid of tail—figure of 8 knot for hind limb—lifting hind limb by the aid of pole—lifting hind limb by the aid of tail, use of pole to prevent kicking—the trevis—casting by ropes in Indian method—casting by ropes in English method—lifting up a fallen bull or cow.

Means of controlling sheep and goats.

The points of the horse and the method of showing them.

Stable gear and uses—stable utensils—bucket—how to water a horse—rack chains—pillar chains—mangers—feeding pans—head and heel ropes—body brush—dandy brush—water brush—curry comb—mane comb—hoof picker—sweat scraper—wisp—rubber glove—clothing—rugs and blankets—quarter sheet—breast cloth—roller—hood—

fly fringes, knee caps, hock caps, bandages, and bandaging head; collar, halters.

Saddles, bridles and harness: varieties of saddles—parts of saddle—saddling a horse—riding bridles—double and single bridles—their parts, martingales—standing and running—driving bridle—collar—driving saddles—their parts--how to put the harness together—how to harness a horse—how to put it and take it off the carriage.

The common breeds of horses, cattle, buffaloes, dogs, sheep, goats and poultry.

Description of horses: colour, breed, sex, age, height, and marks.

Description of cattle: Colour, breed, sex, age, height and marks.

Weight of animals.

Points of the dog—how to secure them for administering medicines and operation purposes.

Methods of administering medicines to horses, cattle, dogs, cats, poultry, sheep and goats.

Names and uses of the more common instruments and appliances in daily hospital use.

Shoeing.

Shoeing—Introduction.

The form and action of the foot.

The hoof—divisions of the hoof—the horny portions—the sensitive foot—growth of hoof—the bones—the elastic structures—the foot as a whole.

Preparation of the Foot.

General principles—instruments—the overgrown foot—proportions of the foot—good bearing surface—treatment of sole and frog—faults and malpractices in preparing the foot—uneven bearing surface—paring the sole—rasping the wall.

Frog pressure and development.

Foals and unshod feet.

The form and manufacture of shoes.

Materials, weight thickness, width—foot and ground surfaces—stamping—fullering—concaving—rodway shoe—calkins—nails and nail holes—machine made shoes.

Selection of shoes.

Racing and steeple chase plates—shoes for hunters, polo ponies, hack, carriage horses, lorry, van, and heavy draught horses.

Fitting and application of shoes.

Level or adjusted surface—outline and surface fitting—Bevelling—wear of shoes—factors governing wear—clips—hot and cold fittings—tips—charlier shœing—nailing on shoes—clinching.

Military shoeing.

Form and manufacture of army horse shoes—hand and machine made shoes—cold shoeing.

Roughing and sharpening.

Necessity for, and disadvantages of

Frost nails—sharpening—tapping and screwing.

Injuries from shoeing.

From nails, clips and from the shoe-corns-burnt sole-interference and injuries caused by the shoe—threads—brushing or cutting—speedy cutting—anti-brushing shoes—wedge heel, knocked up, feather-edged, knocked down, three quarter and donkey heeled shoes—advantages and drawbacks of preventive shoes—over reaching—forging.

Trimming and shoeing the feet of bullocks.

Shoeing Bad Feet.

Flat feet—convex or "dropped" sole—sand cracks—contracted feet—seedy toe—turned-in-wall. Twisted feet.

Leather and rubber pads—

Ring leather frog pads—pneumatic pads—bar pad—Grey's flexible bar pad.

Occasional shoes.

Bar, pattern, Fitzwygram hinged and Nail-less shoes. Fitzwygram Shoeing—cattle and mules.

SECOND YEAR

ANATOMY

PART II

The course shall consist of lectures and practical work having not less than 80 hours for the former and 170 hours for the latter.

Myology—

Detailed description of the superficial muscles of the body and the muscles of the fore and hind limbs—Comparative features of these muscles of the horse and dog only.

Splanchnology—

Description of the organs of the digestive, respiratory, urinary and genital systems.

Angiology—

Blood vascular system:—Pericardium, heart, vessels entering and leaving the heart, aortae and their course and distribution; detailed description of the external and internal jugulars, vena hemiazygos, cephalic, subcutaneous, thoracic and subcutaneous abdominal veins, external and internal saphena veins, portal vein and anterior and posterior venae cavae.

Lymphatic System:—General description of the course of the lymph, lymphatic glands, detailed description of the course of the thoracic and right lymphatic ducts.

Neurology—

General description of the cerebro-spinal and sympathetic systems, detailed description of the nerves supplying the fore and hind limbs.

Aesthesiology—

General description of the skin, eye and ear.

Practical—

All students must dissect the body of the Ox *at least once* and dissect bodies or parts of the bodies of the horse, dog and fowl with a view to study the important points of differences.

Embryology—

Early Embryology—structure and maturition of ovum and spermatozoon, fertilisation, gamatogenesis, germ plasm, germ line,

Meiosis,—the germ layers, formation of the mesoderm, early differentiation in the germ layers, significance of the germ layers—Mesenchyme-origin and fate of coclomic cavity—Embryonic form and membranes, body form and the yolk sac, area vasculosa—Aminion and Chorion, allantois and placenta—placental circulation.

Organogeny—Endodermal derivatives, mesodermal derivatives and ecto-dermal derivatives.

PHYSIOLOGY

PART II

The course shall consist of lectures and practical work having not less than 90 hours for the former and 100 hours for the latter. (Practical Bio-chemistry 30 hours, Experimental Physiology 70 hours).

Endocrine Organs—

General considerations:

The thyroid—structure—effects of removal—Hormone of the hyroidt—relation of iodine to thyroid—disturbances of thyroid function—effects of hyperthyroidism and hypothyroidism.

The Para thyroids—effects of removal—its hormone and its action—Effects of excess and deficiency.

The Pituitary—Anterior and posterior lobes—Hormones of the pituitary—Effects of excess and deficiency.

The Adrenals—Cortex and medulla—Cortical functions.

Adrenaline and its composition and functions.

Pineal—functions.

The thymus—functions.

The testes, ovary and pancreas as endocrine organs.

Inter-relation of the endocrine organs.

Reproduction—

The female generative organs—the sexual cycle—Puberty—Pregnancy.

The ovary—Ovogenesis and follicular development—corpus luteum.

Ovulation and fertilisation. The embryo—Nutrition of the embryo—Foetal respiration and circulation—Foetal growth. Foetal membranes.

Pregnancy changes in the uterus. Gestation.

The mammary gland and milk secretion—The characters and composition of milk of different mammals—control of lactation.

The male generative organs—semen—artificial insemination.

The sex hormones.

Locomotor System—

Skeletal muscle—contraction of muscle—characteristics of the response to stimulation—changes which accompany muscular contraction—Rigor mortis. Smooth muscle—tonus, rhythmicity.

Horse—anti-concussion mechanism—paces employed by the horse.

Nervous System—

The neuron and associated structures—The neuron doctrine—Degeneration and regeneration in nervous tissue.

The nerve impulse—the nature and the changes which accompany the passage of a nerve impulse.

The spinal cord—functions—Fibre tracts of the spinal cord.

Reflex action—spinal reflex mechanisms.

Brain stem and cerebellum—structure and functions.

Postural reflexes—Muscle tonus—Decerebrate rigidity.

Vestibular apparatus.

Cerebral hemispheres, component parts, structure and functions, Localisation of functions.

The higher reflexes—conditioned reflexes.

The autonomic nervous system.

The Special Senses—

Vision—dioptrics of the eye—the retina—structure of the retina—objective changes in the retina during vision, colour vision—Periscopic, Binocular and sterioscopic vision.

Errors of refraction of the eye and their correction.

Examination of the eye—catoptic, ophthalmoscopic and eye-board tests.

Hearing—related structures—mechanism and range of hearing—theories of hearing.

Smell—receptors of sense of smell—olfaction in animals.

Tastes—receptors of sense of taste—classification of tastes.

Cutaneous sensations—tactile sensibility—tactile hairs—sensations of pain and temperature.

Practical Biochemistry—

Estimation of glucose, maltose, lactose and sucrose.

Analysis of gastric contents.

Quantitative estimation of chlorides, urea, sugar, non-protein nitrogen, creatinine and uric acid in blood ; and chlorides, sulphates, phosphates, urea, sugar, creatinine, ammonia, acidity and uric acid in urine.

Examination of urine for the presence of pathological constituents, estimation of sugar and albumin in urine.

Detection of substances of physiological interest.

Experimental Physiology—

Physical properties of blood.—Relative volume of corpuscles to plasma—enumeration of blood corpuscles—estimation of haemoglobin —colour index—fragility test for R.B.Cs.—Determination of viscosity —coagulation time—Blood groups. Appliances used in experimental physiology. Physiological dissection of frog, cat and dog.

Heart—

Physiological anatomy of the mammalian heart—action of valves.

Study of the beat of the frog's heart in-situ. Record of the heart beat—staunius ligatures.

Properties of cardiac muscle—all or none law, staircase phenomenon and refractory period.

Perfusion of frog's heart—action of ions, and drugs.

Electrical variations in the beating heart (Demonstrations).

Innervation of frog's heart—effects of stimulation of vagus.

Response of the mammalian heart to stimulation of vagus, drugs, etc. (Demonstration).

Isolated mammalian heart—coronory perfusion. Its response to temperature and drugs (Demonstration).

Starling's heart—lung preparation. Study of the effects of changes in arterial resistance, venous inflow and temperature on the cardiac output and rate (Demonstration).

Blood vessels—

Perfusion of the frog's blood vessels. Action of drugs and temperature on blood vessels.

Circulation in the mammal. Factors influencing blood pressure and circulation (Demonstration).

Determination of blood pressure—Sphygmomanometer.

Digestive Organs—

Innervation of submaxillary gland. Factors influencing its secretion (Demonstration).

Movements of stomach and intestines—its regulation (Demonstration).

Contractile Tissues—

Nerve muscle preparation.

Methods of stimulation.

Muscle twitch.

Superposition snd summation of contractions.

Genesis of tetanus.

Effect of fatigue on the form of muscle curve.

The effect of load and after-load.

ANIMAL HUSBANDRY.

PART II.

The course shall consist of lectures and practical work having not less than 60 hours for the former and 30 hours for the latter.

(1) *Water—*

Rain water—Surface water—Subsoil water, brooks—streams—rivers—wells—springs—ice water—distilled water—utility of water from various sources—hardness of water—significance of hard and soft water—softening of hard water—action on metals—storage of water—filtration of water—sterilisation of water—amount of water required by animals—effect of sewage polluted water on animals—examination of water and water supplies—interpretation of results.

(2) *Sanitation—*

Drainage system—drain pipes—materials used for making drain pipes—traps and their uses—joining pipes and fittings—laying

drains—defects—testing drains—drainage systems for animal habitations—surface drains—underground drains—various methods of disposal of manure—general principles of sewage—treatment and disposal.

(3) *Air and ventilation*—

Air—composition and physical properties of air—oxygen decrease—carbondioxide increase—significance of carbondioxide—heat and humidity—impurities in air—organic and suspended matter—bad effects of impure air.

Ventilation—Amount of air required—cubic space—general principles of ventilation—natural ventilation—shafts—mechanical ventilation—ventilation of double storied stables—testing the efficiency of ventilation—estimation of carbondioxide—Suspended matter--bacterial content—physical state of atmosphere in a building.

(4) *Building construction and animal habitation*—

Choice of sites—farm buildings—town buildings—arrangements of farm buildings on the site.

Building materials—bricks—tiles—building stones—limes—mortars—cements—concrete—asphalt—timber for building purposes—defects in timber—characters of good timber—construction of walls—mud walls—brick walls—stone walls—construction of roofs—couple roofs—framed roofs—steel structures.

Construction of floors: foundations—bottoming—cement—concrete—asphalt—porous bricks—wood.

Construction of stables for horses: arrangement of stalls—passage air space—ventilation and lighting—flooring—walls—doors—stall divisions—bails—mangers—hay-racks—water pots—yard troughs—horse boxes—horse fastenings—harness room—store and food preparation room—artificial light.

Construction of cow sheds: types of byres and general arrangement of stalls—slope of stalls—flooring of stalls—drainage of byres—milking passage—air space—floor space—food troughs—watering—stall divisions—lighting and ventilation—walls—doorways—food and manure carriers—securing cows, calf-houses—food preparation room—milking shed—milk-house—shed for draft bullocks.

Sheep farming; selection of site, sheep pens.

Construction of poultry houses and equipment—brooding houses—incubation—raising of chicks.

Construction of piggeries:—Types of piggeries and general arrangement—lighting and ventilation—fitting of pens—Construction of dog-kennels—rabbit hutches—duck and goose pens.

(5) *The care and management of animals*—

(*A*) Care of the body, care of legs, skin, hoofs, horns, etc., care of the animals during land and sea transportation, dipping of animals.

(*B*) Management of animals: (*a*) Stable tricks and vices and how to prevent them—teetering or weaving—hiccoughing—wind sucking—cribbiting—biting—tearing the clothing—gnawing the walls and eating their own dropping—baulking—masturbating.

(*b*) Management of working horses—age at which horses are put to various works—breaking and training—amount of work—treatment after strenuous work—fitness of harness and saddlery—bedding.

(*c*) Management of working bullocks and buffaloes—selection—hours of work—pace—care during wet weather—care of the neck—feeding and watering of working oxen yokes—selecting oxen for a pair.

(*d*) Management of dairy cattle—housing—feeding—milking, etc.

(*e*) management of sheep and goats—care of the wool—time of shearing—care after shearing—milch goats.

(*f*) Management of sick animals—housing—feeding—clothing, exercise, etc.

Practical—

Water analysis—physical examination of water—chemical tests for the presence of salts such as chlorides, sulphates, phosphates, nitrates, ammonia, tests for the presence of metals as arsenic, lead, iron, copper, zinc—estimation of hardness of water—estimation of suspended impurities—estimation of organic matter—estimation of pH of water.

Bacteriological examination of water—microscopical examination of sediment—estimation of total bacteria in water—identification and detection of contamination in water.

Air analysis: Estimation of carbondioxide in the atmosphere, testing the efficiency of ventilation in a building.

Examination of wool.

PARASITOLOGY

The course shall consist of lectures and practical work having not less than 120 hours.

Introduction—

General—Parasitism—types—pathogenicity—host specificity—resistance and immunity—epizootology—distribution.

Technique—collection and preservation of helminths—making of permanent preparations—methods of staining.

Clinical diagnostic methods. Examination of material from outside of the animal body. Faecal examination—egg counting technique, faecal cultures—allergic reactions.

A. Helminths—

Platyhelminthes (flat-worms).

Class—*Trematoda* (trematodes or flukes).

1. Family—Fasciolidae—Fasciola—F. gigantica—F. hepatica.

2. Family—Paramphistomidae.—Paramphistomum—P. cervi—P. explanatum.

Cotylophoron—C. cotylophorum—Gastrothylax—G. crumenifer—

Fischoederius—F. elongatus—Gastrodiscus—G. secundus.

3. Family—Troglotrematidae—Paragonimus—P. Westermanii.

4. Family—Schistosomatidae—Schistosomum—S. nasalis; S. spindalis; S. indicum; S. bovis; S. bomfordi; S. incognitum.

Class—Cestoidea (Cestodes or tapeworms).

Order—(Pesudophyllidea) Dibothriocephallidea

1. Family—Diphyllobothriidae—Diphyllobothrium—D.latum; D. reptans —D. felis.

Order—Taenioiidea (Cyclophyllidea).

1. Family—Mesocestoididae—Mesocestoides—M. lineatus.
2. Family—Anoplocephalidae — Anoplocephala — A. perfoliata Moniezia—M. benedeni; M. expansa; Avitellina—A. lahorea.
3. Family—Dilepididae—Dipylidium—D. caninum.
4. Family—Davaineidae—Davainea—D. proglottina—Raillictina R. tetragona.

5. Family—Hymenolepididae—Hymenolepis—H. nana; H. diminuta; H. carioca.

6. Family—Taeniidae—Taenia—T. solium-T. saginata; T. hydatigena;T.multiceps; (Multiceps multiceps) T.gaigeri; T.serialis. Echinococcus—E. granulosus.

Nemathelminthes (Round worms).

Class—Nematoda (nematodes or round worms).

Order—Ascaroidea.

1. Family—Ascaridae—Ascaris—A. equorum; A. vitulorum: Toxocara—T. canis—T. mystax—Toxascaris—T. leonina.
2. Family—Oxyuridae—Oxyuris—O. equi.
3. Family—Heterakidae—Heterakis—H. gallinae. Ascaridia—A. galli.
4. Family—Rhabditidae—Strongyloides—S. sterecoralis: S. papillosus.

Order—Strongyloidea.

1. Family—Strongylidae—Strongylus—S.equinus—S. edentatus—S. vulgaris. Trichonema—T. longibursatum; Oesophagostomum—O. radiatum; O. columbianum, Syngamus—S. trachea; S. laryngeus.
2. Family — Ancylostomidae — Ancylostomum—A. caninum—A. braziliense, A. duodenale. Bunostomum—B. phlebotomum; B. trigonocephalum. Gaigeria—G. pachyscelis. Necator—N. americanus.
3. Family—Metastrongylidae—Metastrongylus—M. apri; Dictyocaulus—D. filaria; D. vivipara. Protostrongylus—P. rufescens.
4. Family—Trichostrongylidae — Trichostrongylus—T. extenuatus, T. colubriformis. Haemonchus—H. contortus. Mecistocirrus—M. digitatus.

Order—Filarioidea.

1. Family—Filariidae—Dirofilaria—D. immitis; D. repens—Dipet alonema (Acanthocheilonema) D. reconditum. Setaria—S. equina; S. cervi (S. labiato—papillosa). Onchocerca—O. indicum; O. cervicalis.

2. Family—Spiruridae—Habronema—H. muscae; H. microstoma. Draschia—D. megastoma.

Ascarops (arduenna) A. strongylina; Physocephalus—P. sexalatus; Spirocerca—S. lupi. Thelazia—T. rhodesii, T. callipaeda. Gongylonema—G. verrucosum; G. ingluvicola. Physaloptera—P. praeputialis.

3. Family—Gnathostomidae—Gnathostoma—G. spinigerum.

4. Family—Philometridae—Dracunculus—D. medinensis (guinea worm).

Order—Trichinelloidea.

1. Family—Trichinellidae—Trichinella—T. spiralis.

2. Family—Trichuridae—Trichuris—T. ovis—T. discolor.

Class—*Acanthocephala* (Thorny—headed worm).

Family—Gigantorhynchidae—Macracanthorhynchus—M. hirudinaceus.

B. Entomology.

Class—*Insecta.*

Orders—Diptera. Series—Nematocera.

1. Family—Culicidae—Culex—C. fatigans; Anopheles—A. rossi. Stegomyia (Aedes) S. aegypti.

2. Family—Psychodidae—Phlebotomum—P. argentipes (Sand fly).

3. Family—Simuliidae—Simulium—S. damnosum.

4. Family Chironomidae—Chironomus sp.

5. Family—Ceratopogonidae—Culicoides—C. austeni.

Series 2—Brachycera.

1. Family—Tabanidae—Tabanus—T. striatus — Haematopota — H. Pluvialis; Chrysops—C. dimidiata.

Series 3—Athericera.

1. Family—Muscidae — Musca—M. domestica — Calliphora—C. vomitoria; Lucilia—L. sericata—Chrysomia—C. bezziana—C. megacephala—stomoxys—S. calcitrans—Glossina—G. palpalis—Lyperosia—L. exigua—Philaematomia—P. insignia.

2. Family—Sarcophagidae—Sarcophaga—S. erythrocephala.

3. Family—Oestridae—Oestrus—O. Ovis—Gastrophilus—G. intestinalis Hypoderma—H. bovis.—H. lineata.

Series 4—Pupipara.

1. Family—Hippoboscidae — Hippobosca—H. maculata — Melophagus M. ovinus—Pseudolynchia—P. maura.

Order—

Siphonaptera (Fleas).

1. Family—Pulicidae — Pulex—P. irritans — Ctenocephalus—C. canis ; C. felis.

2. Family—Sarcopsyllidae—Xenopsylla—X. cheopls—X. astia—X. braziliensis—Echidnophaga—E. gallinacea.

Order—

Anoplura—Siphunculata (sucking lice).

1. Family—Haematopinidae—Haematopinus—H. tuberculatus—H. eurysternus.

Linognathus—L. vituli.

Order—

Mallophaga (Biting lice).

1. Family—Trichodectidae—Trichodectes—T. canis—Bovicola—B. bovis.

2. Family—Menoponidae—Menopon—M. biseriatum. Lipeurus—L. caposin.

Order—

Hemiptera (Bugs).

1. Family—Cimicidae—cimex—C. rotundatus—C. lectularius (Bed bug).

2. Family—Reduviidae—Triatoma—T. rubrofasciata.

Class—*Arachnida*—Order—Acarina.

1. Family—Ixodiidae—Ixodes—I. ricinus.

Rhipicephalus—R. Sanguineus—Margaropus—M. annulatus—Haemophysalis—H. bispinosa—Hyalomma—H. aegyptium.

2. Family—Argasidae—Argus—A. persicus—A. savignyi (Ornithodorus savignyi) A. moubata (Ornithodorus moubata) A. megnini (Ornithodorus megnini—Spinose eartick).

3. Family—Sarcoptidae—Sarcoptes—S. scabiei. Chorioptes—C. equi—Psoroptes—P. communis ovis. Otodectes—O. cynotis.

4. Family—Demodicidae—Demodex—D. folliculorum.

5. Family Dermanyssidæ—Der manyssus—D. gallinae (Fowlmite)

6. Family-Trombidiidae—Trombicula—T. autumnalis (velvet mite).

Class—Pentastomida.

1. Family—Porocephalidae—Porocephalus—Linguatula—L. Serrata (tongue worm).

The vegetable parasites of the skin—parasitic fungi. Group-Ascomycetes—Genera (*a*) Trichophyton, (*b*) Microsporon, (*c*) Achorion and (*d*) Aspergillus.

Protozoa.

1. Class Rhizopoda.

Family—Amoebidae—Entamoeba—E. histolytica—E. coli.

Class—*Mastigophora*.

1. Family—Trypanosomidae—Leishmania—L. donovoni—L. tropica—L. caninum. Leptomonas—L. ctenocephali—Crithidia—C. tabani. Trypanosoma—T. evansi—T. equinum—T. equiperdum—T. brucei—T. congolense—T. rhodesiense—T. gambiense—T. lewisi—T. theileri—T. melophagium—T cruzi.

2. Family—Trichomonadidate.—Trichomonas—T. vaginalis—T. foetus.

Class—Sporozoa.

1. Family—Eimeriidae—Eimeria—E. zurnii—E. steidae—E. perforans—E. tenella.

Isospora—I. rivolta—I. bigemina.

2. Family—Babesiidae—Babesia—B. bigemina—B. bovis—B. mutans—B. canis—B. gibsoni—B. caballi—B. equi—B. motasi—B. sergenti.

3. Family—Theileriidae—Theileria—T. parva.

4. Family—Haemoproteidae—Haemoproteus—H. columbae—Leucocytozoon—L. neavii.

5. Family—plasmodiidae—Plasmodium—P. vivax—P. malariae P. falciparum—P. bubalis—P. praecox—P. gallinaecae.

6. Family—Hepatozoidae—Hepatozoon—H. canis.

Class—*Ciliata.*

Balantidium—B. coli—B. suis.

Spirochaetes—

Borrelia—B. gallinarum—B. theileri.

Leptospira—L. icterohaemorrhagiae.

Treponema—T. pallidum—Spirillum—S. minus.

Parasites of Undetermined Position.

Class—*sarcosporidia.*

Sarcocystis—S. tenella—S. meiserii—S. blanchardi—S. bertrami. Rhinosporidium—R. seeberi—R. equi.

A brief account regarding the animal and the vegetable parasites mentioned above, their control, disaeses produced on the various hosts with prominent symptoms and treatment of such conditions will be taught.

Practical:

Methods of collection and preservation of parasites, examination of the more common ones, staining and mounting. Examination of faeces, scrapings, and other material for the diagnosis of parasites, ova, or larvae, making cultures of faeces and egg counts. Staining and examining protozoan organisms. Preparation of ectoparasites for examination and preservation.

PATHOLOGY AND BACTERIOLOGY

PART I

The course shall consist of lectures and practical work having not less than 50 hours for the former and 30 hours for the latter.

Health and disease—causes of disease—Pathogenesis—Lesions, gross and microscopic—Effects of disease, complications and sequelae.

Bacteria and Nature of Bacterial disease—Epizootics and Enzootics—invasion—infection—virulence—resistance aud susceptibility of the host—Pathogenicity.

Acute inflammation—Vascular disturbances—Degenerations and infiltrations—pyogenesis—localised and generalised disease process—necrosis and gangrene—pyaemia, bacteraemia, septicaemia, toxaemia.

Chronic inflammation—regeneration and repair—atrophy, hypertrophy, hyperplasia, metaplasia, anaplasia—nature and causation of neoplasms.

Biology of bacteria and viruses—laboratory methods of sterilisation—culture media—aerobic and anaerobic cultivation—identification of bacteria by morphological, biological and serological tests.

Immunity—principles of immunity—antisera, bacterins, vaccines—diagnostic serological tests—methods of immunization against diseases with special reference to Rinderpest, Haemerrhagic Septicaemia, Black quarter, Anthrax and Rabies—Anaphylaxis—Allergy and allergic tests.

Principal characteristics of the following bacteria, with Pathology and Bacteriological diagnosis of the diseases produced by them in animals:

Staphylococcus aureus, citreus, albus.

Bacillus anthracis, anthracoid organisms.

Clostridium chauvoei, septique, oedematiens, welchii, tetani, botulinum.

Brucella abortus, melitensis, bronchiseptica, tularensis.

Bacterium coli, abortus equi, abortus ovis, equirulis, pullorum, gallinarum; food-poisoning; (Bacterial).

Mycobacterium tuberculosis, paratuberculosis.

MATERIA MEDICA AMD PHARMACY.

The course shall consist of lectures and practical work having not less than 90 hours.

PART I—INTRODUCTION AND GENERAL DEFINITIONS.

Definitions of Terms.

Materia Medica, Pharmacy, Pharmacology, Toxicology, Pharmacopoea—B. P. and U. S. A. P.

Source and Compositions of Drugs.

Organic—inorganic—vegetable kingdom—gross anatomy of plants—chemistry of plants—alkaloids—glucocides—saponins—Neutral principles—fixed oils—volatile or essential oils—fat—waxes—resins—oleo resins—gums—gum resins—balsams.

Pharmaceutical Processes.

Desiccation—comminution—trituration— separation — distillation —sublimation—carbonization—ignition—torrefaction— evaporation—solution—straining—filtration—decantation —clarification—levigation —elutriation — lixiviation — expression — maceration—percolation—scaling—standardising—biological assay.

Weight—Measures and Symbols.

Imperial system—metric system—approximate equivalences of imperial and metric—domestic measures. Important Latin words and phrases with their abbreviations and English equivalents.

Pharmacopoeal Preparations.

Aceta, aquae, confections, emplastra, emulsa, extracta, infusa liquores, linimenta, lotions, mucilagenes, misturae, mellita, decocta, tincturae, pilulae, pulveres, suppositoria, syrupi, unguenta, cata plasma, collyria, enemata, haustus, bolus, capusulae, electuarium, lamellae, gargarisma, fomenta.

Administration of Drugs.

Oral, subcutaneous, intramuscular, intratracheal, intravenous, per rectum, by skin, inhalations, epidural, intrathecal.

Actions of Drugs.

Primary, secondary, local, remote.

Factors Modifying Actions of Drugs.

Age, sex, species, weight, tolerance, idiosyncracy, time, mode and frequency of administration, form of medicine, nature of disease, rate of excretion.

Prescription·Writing and Incompatibility.

Definition of various terms used in Materia Medica to indicate actions of drugs.—Sialagogues, antisialics, demulcents, stomachics, gastric stimulants, gastric sedatives, carminatives, emetics, antacids, purgatives, intestinal astringents, antizymotics, anthelmintics, cholagogues, diuretics, vesical sedatives, lithontriptics, urinary antiseptics, aphrodisiacs, anaphrodisiacs, ecbolics, emmenagogues, galactagogues, cardiac stimulants, cardiac tonics, cardiac depressants, vaso-constrictors and vaso-dilators, expectorants, respiratory stimulants, respiratory sedatives, erhines, cerebral stimulants, cerebral sedatives, hypnotics, narcotics, anodynes, antispasmodics, anaesthetics, mydriatics, myotics, tonics, haematinics, alteratives, febrifuges, diaphoretics

anhidrotics, counter-irritants, caustics, styptics, astringents, emollients, parasiticides, antiseptics, disinfectants, antipruritics, keratolytics, deodorants.

PART II—MATERIA MEDICA.

Alkalies and Alkaline Earths.

Potassium, Sodium, calcium, barium, magnesium, ammonium.

Metals and Metalloids.

Lead, silver, zinc, copper, aluminium, iron, mercury, bismuth, arsenic, antimony, and phosphorus.

Halogens.

Bromine, chlorine, iodine, iodoformum.

Sulphur Compounds.

Acids.—Sulphuric, nitric, hydrochloric, chromic, picric, boric, acetic, tartaric, citric and prussic acid.

Water and Oxygen and Hydrogen Peroxide.

Carbon and its Compounds.-Carbo-ligni, carbo-animalis, carbondi, sulphide, carbon tetrachloride, tetrachlorethylene, alcohol, chloroform, Aether, chloral hydras, chloratone, collodion, amyl nitrite, nitro-glycerine, sodium nitrite, spiritus Aetheris nitrosi, Formaldehyde, Hexamine, Benzoin, antipyrine, antifebrin, phenacetin, resorcinol, salol, naphthalen, beta naphthol.

Coal Tar Derivatives.

Chinosol, phenol, creosotum, cresol, lysol, acriflavine.

Dyes.

Trypan blue, methylene blue, gentian violet, scarlet red, brilliant green.

Paraffins.

Paraffinum durum, molle and liquidum.

Miscellaneous.

Sulfa drugs, penicillin.

Vegetable Kingdom.

Aconite, colchicum, opium, Indian hemp, cocaine, eucaine, stovaine, novocaine, quinine et-urea hydrochloride, belladonna, hyoscyamus,

tobacco, lobelia, calabar bean, jaborandi, nuxvomica, caffeine, digitalis, strophanthus, squill, ergot, calumba gentian, quassia, aurantium, hydrastis.

Aromatic Volatile Oils.

Oil of cloves, peppermint, anisi, cardamomum, zingiber, eucalyptus, turpentine, terebene, resin, thymol, camphor, venice turpentine, pepper, cubebs, mustard, pixliquida, oleum picis, picis carbonis, pix burgundica.

Arnica, benzoinum, balsam of tolu, valeriana, asafoetida, buchu.

Vegetable Purgatives.

Aloes, rhubarb, jalap, senna, cascara sagrada, croton oil, castor oil, linseed oil, olive oil, ground-nut oil.

Anthelmintics.

Male-fern, santonin, oleum chinopodium, areca-nut, kamala, phenothiazine.

Astringents.

Galls, catechu, hamamelis, chrysarobinum, ipecacuanha, cinchona, quinine, salicylic acid, yohimbine.

Soaps, glycerinum, treacle, syrup, tragacanth, acacia, liquorice root, amylum.

Animal Kingdom.

Lanolin, lard, suet, beeswax, gelatin, keratin, ichthyol, codliver oil, honey, pepsin, nuclein, cantha ridis.

Endocrine Products.

Adrenaline, pituitary extract, thyroid extract and thyroxine, parathyroid, insulin.

Vitamins.—A, B, C, D, E, K.

Common Bazaar Drugs.

Ajowan, sweet flag, butea frondosa, coriander, cumin, dill seeds, embellica, myrobalans, allium sativa, physic nut, turmeric, etc.

Part III—Pharmacy

Practice in the art of weighing, measuring, compounding and dispensing powders, boluses, pills, electuaris, mixtures and drenches,

hypodermic injections, ointments, emulsions, lotions, including folding of powders, wrapping, labelling of packages and bottles.

THIRD YEAR.

PHARMACOLOGY INCLUDING EXPERIMENTAL PHARMACOLOGY.

The course shall consist of lectures and practical work having not less than 130 hours.

Drug therapy—the pharmacological action of drugs on the different organs and functions of the body.

The mouth and salivary glands—sialagogues—antisialics—demulcents.

The stomach—stomachics—gastric stimulants—gastric sedatives—gastric astringents—gastric tonics—carminatives.

Emetics—antacids—gastric antiseptics.

The intestines—purgatives—intestinal astringents—intestinal antiseptics.

The liver—chologogues.

The urinary organs—Diuretics—vesical sedatives—vesical tonics, lithontriptics—urinary antiseptics.

The generative organs—aphrodisiacs—anaphrodisiacs, ecbolics.

The mammary glands—Galactogogues—antigalactogogues.

The circulation—cardiac stimulants—cardiac tonics—cardiac depressants—vaso constrictors—vasodilators.

The respiratory organs—expectorants—respiratory stimulants—respiratory sedatives.

The eye—mydriatics—myotics—antiseptics.

Tissue change—tonics—haematinics—diaphoretics.

The surface of the body—counter-irritants—cold and hot applications—poultices—caustics, styptics or haemostatics and astringents—emollients.

The nervous system—cerebral stimulants—cerebral sedatives—hypnotics—narcotics—anodynes—antispasmodics, anaesthetics—spinal stimulants—spinal depressants.

Anaesthesia—general remarks—the merits and demerits of chloroform, ether—A. C. E. mixture—chloral hydrate, etc.—methods of administration to the different animals.

The different stages of chloroform anaesthesia—danger signals—antidotes—artificial respiration.

Local anaesthetics—agents suitable and indications for use—cocaine and its derivatives.

Vaccine and serum therapy—Agents used in local diseases—autogenous vaccines.

Organotherapy—the actions of thyroid, pituitary—supra renal and ovarian extracts.

Chemotherapy—the actions of drugs commonly used; other forms of therapy *e.g.* radio and oxygenotherapy and their application to local diseases.

Experimental Pharmacology.

Demonstrations of actions of drugs in intact animals, on blood pressure, respiration, urination, gastric and intestinal movements, uterine contractions, elimination of vagal endings by atropinisation, elimination of sympathetic vaso-constrictors by Ergotisation (Dale's reversal) and perfusion of isolated frog's heart to demonstrate the action of drugs on the heart-muscle.

THIRD YEAR.

PATHOLOGY AND BACTERIOLOGY.

PART II.

The course shall consist of lectures and practical work having not less than 110 hours for the former and 50 hours for the latter.

Diseases of the respiratory system, digestive system, urinogenital system, circulatory system, nervous system, locomotor and endocrine systems.

Principal characteristics of the following, with pathology and bacteriological diagnosis of the diseases produced in animals:

Pseudomonas aeruginosa, Proteus vulgaris, Pasteurella septica.

Pseudotuberculosis rodentium.

Pfeifferella mallei.

Actinomyces bovis.

Actinobacillus lignieresi.

Fusiformis necrophorus.

Vibrio foetus.

Streptococcus agalactiæ, equi, pyogenes.

Corynebacterium pyogenes, ovis, equi.

Cryptococcus farciminosus.

Listerella spp.

Viruses of C.B.P.P. and C.C.P.P., Rinderpest, Foot-and-mouth disease, rabies, distemper, mammalian and avian pox, Fowl pest, Doyle's disease, Equine encephalitis.

Diseases of the haemopoietic system.

Classification of neoplasms—Pathology of common tumours of animals—Avian leucosis.

Pathology of Fowl spirochaetosis, canine piroplasmosis, and canine leptospirosis.

Methods of Bacteriological diagnosis. Autopsy work—collection, preservation, and examination of morbid materials.

ANIMAL HUSBANDRY.

Part III.

(Animal Nutrition and Dietetics and Dairy Science).

Third Year.

The course shall consist of lectures and practical work having not less than 60 hours for the former and 90 hours for the latter.

Economics of milk production, milk consumption, Economics of market milk, Dairy breeds of cattle in India, selecting the individual cow, known inherited characteristics of dairy cattle, management of dairy cattle, Record keeping, Efficiency and cost of milk production.

I. Comparison and function of foods: General analysis—water—succulent and non-succulent foods—carbohydrates—crude—fibre—soluble carbohydrates or nitrogen free extract—monosacharides—disacharides—polysacharides—starch—cellulose—lignin—cutin —dextrose—glycogen—gums—mucilage—fat or ether extract—the proteins—crude protein—true protein—non-protein nitrogenous substance—nitrogenous concentrates—amino acids—classification of proteins—simple proteins—conjugated proteins—glucosides—alkaloids—functions of food constituents—water—nitrogen—crude fibre—fat—protein—minerals—mineral elements of the body—the role of minerals in nutrition—mineral requirements of animals—mineral composition of foods—mineral composition of pastures—relation of minerals to disease—vitamins.

II. *The foods*—Grains and seeds—composition, varieties and by-products of oats, wheat—barley—maize—rice and millets. Common leguminous seeds of India and their by-products—gram—lentil—Kulthi, etc.

Grasses and forage plants, etc.

Some common grasses in South India: Andropogon annulatus, Andropogon monticola—Andropogon pumilus—Cynodon dactylon, Digitaria sanguinalis—Eriochloa polystachya—Panicum colonum—Panicum crus—galli—pennisectum cenchroidus—setaria verticellata—Medicago sativa.

Hay—Hay making.

Straws.

Silage and silos.

Oil-cakes—methods of manufacture—cocoanut, cotton seeds.

Groundnut—linseed—sesame—soyabeans—compound cakes.

Animal products—carcase residues—bone meal—blood meal—fish meal—milk and its byproducts.

III. The nutritive value of food energy—gross energy—metabolisable energy—net energy—starch equivalent—maintenance starch equivalent—production starch equivalent—food units—monetary value of foods—manurial value of foods—nitrogenous ratios—fatty ratios.

IV. Preparation and storage of foods—cooking and heating—damping—soaking—grinding—crushing—cutting or chaffing hay and straws—storage of grains—cakes.

V. Feeding of animals:

Maintenance ration of animals—feeding dairy cows and dairy buffaloes—general principles—bulk—minerals—water—palatability—effects of foods on cow and foetus—effects of roots—foods affecting milk and butter—requirement for maintenance—requirement for milk production—requirement of foetus—feeding cows preparatory to calving—feeding after calving—wet and dry feeding—constructing rations—examples of rations—general management in cow sheds.

Calf rearing—treating of new born calf—systems of calf-rearing—points in calf management.

Feeding of horses—food requirement of working horses—coarse fodder—rations for working horses—feeding during idleness—feeding on pasture—feeding mares in foals—feeding foals—food requirements

of working cattle and buffaloes; feeding idle animals; their rations—feeding of sheep—pigs—dogs.

Principles of poultry nutrition—nutritional requirements of poultry—feeding and management—care, feeding and management of chicken.

VI. Some harmful foods—mouldy and decomposed foods—mow-burnt hay—new grains—dried brewers grains—lathyrus peas—foods containing cyanogenetic glucosides—flesh products—fish meal—cotton seed, castor seed—soya beans—ergot—salt poisoning.

Dairy Science.

Good points in the udder of milch cow— secretion of milk and modification of its contents—circumstances affecting the flow—duration and quantity of milk—pregnancy affecting milk secretion—appearance and composition of normal cow's, buffaloe's and goat's milk—adulterants and their detection colostrum—use of lactometer and the specific gravity of milk of various animals—good points in cow's milk—various fats in milk—volatile and non-volatile—estimation of fat in milk—albuminoids of milk—circumstances affecting quality of milk—'Milk standards' and grading of milk—methods of milking—cleanliness of milkman — Sterilisation of utensils — bacteriology of milk — normal bacterial content—methods of estimating the number and kind of bacteria in milk—sources of contamination—diseases of the udder and their recognition—diseases conveyed by milk of diseased animals —products of milk—skimmed milk—butter milk—butter—ghee—cheese, etc. Demonstrations of methods adopted in a model dairy farm —changes undergone by milk on keeping—scouring and clotting of milk—preservation, storage and transmission of milk and its products —refrigeration—pasteurisation and boiling—essential requirements for safe and sanitary milk supply.

Practical:

Animal nutrition and dietetics—examination of starch granules of different grains— simple tests for the presence of carbohydrates, fats, proteins, fibre, etc., in foodstuffs.

Estimation of dry matter content of foodstuffs—estimation of ash content—tests for the minerals in ash—estimation of calcium and phosphorus contents of foodstuffs—estimation of protein—true and crude protein—estimation of fat—estimation of fibre—estimation of carotene contents of foods—estimation of vitamins B. C. and D.

Simple digestion experiments (demonstration only).

Milk.

Physical examination of milk; estimation of fat, volatile and non-volatile—estimation of protein—estimation of lactose—estimation of total solids—estimation of ash content—tests for the preservatives and adulterants—bacteriological examination of milk—preparation of butter—ghee—cheese—casein.

SURGERY.

THIRD YEAR.

The course shall consist of lectures and practical work having not less than 100 hours.

General Principles.

Inflammation—its nature—causes—results—symptoms and general treatment.

Abscesses – acute and chronic.

Ulceration—Necrosis and gangrene.

Sinus and fistula.

Wounds—varieties—symptoms and treatment—frost bite—burns and scalds.

Complications or sequelæ of wounds—syncope—shock—traumatic neuralgia—hæmorrhage—emphysema—thrombosis and embolism—cellulitis—erysepelas—scepticæmia and pyæmia—malignant œdema—tetanus.

Cysts—varieties—symptoms and treatment.

Affections of blood vessels — Arteries — wounds — aneurism—arteritis and thrombosis of aorta and iliac arteries.

Veins—wounds—phlebitis—venous thrombosis—excision of jugular vein—varicose veins—air embolism—hæmatoma—hæmorrhoids.

Affections of Lymphatic system—Wounds—lymphangitis and adenitis.

Affections of nerve Tissue—Traumatic lesions—effects of neurectomy—compression—contusion of nerves—suturing nerves—neuroma—neuralgia—neuritis—paraplegia—hemiplegia.

Paralysis of suprascapular, radial, obturator, crural, sciatic, internal popliteal and external popliteal nerves.

Stringhalt, shivering and kumri.

Affections of bones.—Contusions—ostitis—periostitis—osteoperiostitus—osteomyelitis—osteoporosis—caries—necrosis—malignant diseases—rickets.

Fractures—varieties, symptoms—treatment—complications.

Affections of Bursæ—Contusions and open wounds—bursitis—acute and chronic.

Synovial sheaths—contusions—open wound—acute closed synovitis, chronic synovitis, purulent synovitis, infectious tenosynovitis.

Affections of Joints—Deformities in animals.

Affections of Muscles—Functional and organic.

Functional—paralysis—spasm.

Organic—myositis—atrophy—hypertrophy—degeneration—sprains and ruptures of various muscles.

Affections of Tendons and Ligaments—Contusions—open wounds.

SURGICAL ANATOMY.

Students are taught the surface anatomy of the horse, cattle, dog and fowl. They are also instructed on the applied anatomy of the parts that are commonly subjected to operations.

The Head and Neck.

Superficial examination—the tongue—the soft palate—the œsophagus—salivary gland—the larynx—trachea—the guttural pouches—the sinuses of the skull—the temporo-maxillary joint—the ligamentum uchae—the region of the atlas—the eye—the external ear—the seat of phlebotomy.

The Fore Limb—Superficial examination—the bones and joints—the seats of median neurectomy—ulnar neurectomy, plantar neurectomy, digital neurectomy—the tendons, ligaments, bursae and tendon sheaths that are commonly affected.

The Hind Limb—Superficial examination—the bones and joints—seats of posterior tibial and anterior tibial neurectomies—seat of spavin—seat of curb—the tendons, ligaments, bursae and tendon sheaths that are commonly affected.

The Foot—The hoof—the keratogenous membrane—complementary apparatus—the bones and joints.

The Thorax and Back—Superficial examination—region of the heart—region of the lungs—region of the diaphragm.

The Abdomen, Loins etc.—The abdominal wall—the umbilical opening—the inguinal canal—rectal exploration—the croup—the tail.

The Uro-Genital Organs—The male genital organs—the female genital organs.

MEAT INSPECTION.

FOURTH YEAR.

The course shall consist of lectures and practical work taken together and having not less than 60 hours.

Note.—There shall be demonstration classes at the slaughter houses.

Origin and source of meat food.

Objects—necessity for regulations—state and municipal inspection—methods of inspection antemortem and postmortem.

Abattoirs—methods of slaughter and dressing of carcases—rigor mortis and the setting of meat.

Normal condition of carcases—dressed weight.

Classification and various cuts of meat.

Adipose tissue and its localities in carcases.

The lymphatic glands of the body.

Comparative anatomy of the most important viscera—blood, bone marrow, heart, kidney, liver, etc., of ox, horse, sheep, goat, pig, dog and fowl.

Peculiarities of meat from various food animals.

Fraudulent substitution for meat and their recognition.

Meat preparation like—chopped meat—sausage.

Determination of fat animals during life.

Methods of conserving meat—frozen meat—chilled meat—salted and pickled meat—dehydrated meat—smoked meat—chemical preserving methods.

Peculiarities within physiological limits—foetal flesh—veal—slink veal—leanness—abnormal odour and taste—abnormal colour of the fat—defective bleeding.

Changes in carcases not properly slaughtered—suffocation—fatigue—animals killed in moribund condition—fevered flesh.

Diseased condition caused by bacteria and parasites—parasites transmissible to man through eating flesh—infectious diseases communicable to man—parts to be condemned—disposal.

Detailed instructions for the inspection and disposal of tubercular carcases.

Detailed instruction for the inspection and disposal of carcases infected with animal parasites

Putrefaction—phosphorescent meat—fly blown meat—meat poisonings—conditions rendering the flesh innutritious—emaciation—intoxication and anteintoxication—effects of drug on meat—effects of food on meat—normal death of animals—emergency slaughter—examination of poultry and fish.

CLINICAL MEDICINE INCLUDING THERAPEUTICS AND TOXICOLOGY.

FOURTH YEAR.

The course shall consist of lectures and practical work having not less than 105 hours.

General Therapeutics—The Course—complications—terminations-sequelae of disease—prognosis.

Temperature charts—crisis of disease.

General principles governing treatment—rational and empirical therapeutics—symptomatic treatment—specific remedies and their limitations.

Nursing—the care and feeding of sick animals—nutrient enemata—clothing.

The internal administration of therapeutic agents.

Derenches—stomachtube—pills—powders—electuaries—inhalations—suppositories—pessaria—enemata—injection—hypodermic, intra-dermic, intravenous, intramuscular, intratracheal, intra-mammary, intra-uterine and intra-thecal.

A. Semiology and Diagnosis—General remarks on case taking—history of case—previous illness—surroundings—food—general appearance of the patient—pyrexia—anorexia—diagnosis.

Methods of Physical examination—Inspection—palpation—percussion and auscultation—rectal examination, etc.

Symptoms furnished by Visible Mucous membranes.

Symptoms Connected with Circulatory System—Pulse—its frequency rhythm and quality—Venous pulse—Change in heart sounds due to disease.

Symptoms Furnished by Respiratory System.—Respiration, different types—nasal discharge—physical examination of chest—inspection, palpation, percussion and auscultation—normal and abnormal sounds.

Symptoms Furnished by Digestive organs—Salivation—arrest of salivary secretions—alteration in buccal mucosa—fector oris—constipation—diarrhoea—vomition—eructations—cessation of rumination—grunting—pain—attitudes and postures assumed by patient—physical examination of the organs and parts.

Symptoms Connected with Urinary System—Dysuria—Strangury—retention of urine—incontinence of urine—palpation of kidney, bladder, etc.

Examination of urine—albuminuria—haematuria—haemoglobinuria—glycosuria—polyuria—bile pigments in urine.

Symptoms in connection with the Nervous System.

Symptoms furnished by the surface of the body and extremities—Rigors—Sweating—coldness of the extremities—oedema of the limbs—dropsical swellings.

Special methods of diagnosis.—Examination of smears, faeces, scrapings, tuberculin tests, etc.

X-Ray as an aid to diagnosis.

The morbid anatomy—macroscopic and microscopic (where necessary)—symptoms—diagnosis and treatment of diseased conditions in the different systems.

The digestive system—stomatitis, glossitis, ptyalism—pharyngitis spasm and stricture of oesophagus—tympanites—impactions of the rumen and omasum—gastritis—rupture of the stomach—omasitis—abomasitis—indigestion—enteritis—colic— volvulus—intussusception-impaction of colon—constipation—diarrhoea—seasonal diarrhoea in cattle—superpurgation—dysentery—calculi.

The liver—congestion—hepatitis—fatty liver—cirrhosis–jaundice.

The peritoneum—peritonitis—ascites.

The respiratory system—catarrh—coryza—laryngitis—whistling and roaring—bronchitis—asthma—congestion of the lungs—pneumonia—pleurisy—emphysema and broken wind—hydro-thorax—pneumothorax.

The circulatory system—pericarditis—endocarditis—hypertrophy-dilatation and rupture of the heart—valvular disease—cyanosis—syncope.

The lymphatics—lymphangitis.

The kidneys and bladder—congestion—nephritis—calculi—haematuria—haemoglobinuria—albuminuria—cystitis—spasm—stricture and rupture of the bladder.

The nervous system—Delirium—convulsions—coma—paralysis paraplegia—hemiplegia—hyperaesthesia—cerebral congestion—staggers—apoplexy—epilepsy—eclampsia—chorea—meningitis.

Non-parasitic diseases of the skin—erythema—urticaria, eczema dermatitis—prurigo—psoriasis.

Deficiency diseases—avitaminosis—calcium deficiency, rickets—osteoporosis—goitre.

Unclassified diseases—general and constitutional—rheumatism azoturia—diabetes Milk fever—heat-stroke and sun-stroke, lightning stroke, electric shock, night blindness in cattle—non-sweating in horse—prickly-heat in horse.

Toxicology—Definition of a poison—general chemistry of poisons—conditions governing their action, absorption, distribution, accumulation and elimination—individual idiosyncracy.

Classification of poisons—corrosives—irritants—narcotics.

Diagnosis and general treatment.

Preservation of materials for examination.

The sources, symptoms—postmortem appearances and antidotal treatment in:—

(*a*) Mineral or inorganic poisons—arsenic—antimony—lead—mercury—copper—zinc—silver—phosphorus—acids—alkalies—chlorine—iodine—carbon-dixoide—carbon monoxide.

(*b*) Organic poisons—prussic acid—carbolic acid—strychnine, morphine and opium—cocaine—eserine—pilocarpine—emetine—cannabis indica—santonin—turpentine—camphor—alcohol—oil of chenopodium—cantharides—picrotoxin—carbon tetrachloride, etc.

(*c*) Poisonous plants—abrus precatorius—nerium odorum cerbia thevetia—ricinus communis—croton tiglium—atropabelladonna —calatropis—gigantea—hyoscyamus niger—datura stramonium—nicotiana tabacum—digitalis purpurea—lathyrus sativas.

(*d*) Diseased moulds and food—ustilago carbo-puccinia graminis claviceps purpurea.

(*e*) Foods reported to be poisonous—cotton seed cake or meal—brewer's and distiller's grains—horsegram—cholam or jowar.

FOURTH YEAR.

ANIMAL HUSBANDRY, PART IV.

(Genetics and Animal Breeding).

The course shall consist of lectures and practical work having not less than 60 hours for the former and 30 hours for the latter.

A. Genetics.

The materials of genetics—variation, its nature and causes—theories of heredity.

Mendelian inheritance—Mendel's materials and methods—monohybrids and dihybrids—extension and modifications of mendelian hypothesis—factor interaction—linkage—multiple factors—inheritance of size, coat, color, inheritance of milk yield—inheritance in sheep.

The carriers of heritage—the cell—cell-division—the hereditary bridge—the genes and the chromosomes—the chromosome theory—the nature of the gene and the expression of genetic action.

Linkage—sex linked inheritance—crossing over—interference—lethal factors—mutation—the arrangement of genes—chromosome maps.

The physiology of sex—differentiation—sex determination—gonadectomy in insects; mammals and birds—hormonic rejuvenation—harmonic intersexuality—the free martin.

Pseudo intersexuality in the mammal, sex reversal in the fowl, hermaphroditism in mammals—parthenogenesis—control of the sex.

Hybridisation—interspecific and intraspecific hybridisation—the nature of hybrids—their reproduction—establishment of new forms—telegony—maternal impression—reversion—the transmission of inherited characters.

B. Breeding.

Selection of animals—selection of stallions and mares—age at which to breed—prevention of injuries to stallions and mares during service—feeding and exercise of stallions—care of foaling mares—their feed and exercise—foaling—care of the foal—weaning the foal.

Cattle—selection of bulls and cows for various purposes—milk production—work purposes—beef—age at which to breed—food and exercising of breeding bulls—care of cows before and after calving—their feeding and exercise—calving—care of the calves—weaning.

Sheep and goats—selection of rams and ewes for different purposes—age at which to breed—mating seasons—care of ewes before, during and after pregnancy.

Poultry—age for breeding—eggs, fertile and infertile—hatching, natural and artificial.

Breeding—exogamy and endogamy—inbreeding, selection of sire—breeding—outbreeding—heterosis, prepotency twinning, method of conducting breeding investigations. Artifical insemination—its advantages and disadvantages.

A short description of the prominent Indian breeds—Tharparkar Red Sindhi, Gir, Sahiwal, Kankrej, Ongole, Hariana and Murrah Buffaloe.

A short description of the more important breeds of cattle in the Madras Presidency—Amritmahal, Alambadi, Hallikar, Gumsur, Jellicut, Kangayam, Ongole, the cross bred breed.

A short description of important breeds of sheep and goats.

Practical.

Principles of poultry breeding—selection and improvement—some of the more important breeds of India—foreign breeds.

Artificial collection of semen—physical examination of semen—estimation of pH of semen—methods of preservation of semen—different kinds of dilution of semen—metabolism experiments on semen—insemination of animals (demonstration). Biological methods of diagnosis of pregnancy.

PREVENTIVE MEDICINE.

FOURTH YEAR.

The course shall consist of lectures and practical work having not less than 120 hours for the former and 120 hours for the latter. In

addition students are required to devote not less than 180 hours in hospital practice.

A. GENERAL.

Definition of—

Sporadic—contagious—epizootic—enzootic—etiology—period of incubation—semiology — course — diagnosis — prognosis — pyaemia—septicaemia—toxaemia.

Disease Survey.

Acts applicable in India—Rules and regulation regarding transport of animals.

Fevers.

Simple and specific—classical symptom—treatment.

Contagious Diseases.

Methods of transmission—general principles governing treatment and prevention—Immunity.

B. SPECIFIC DISEASES.

Acute General Infectious Diseases.

Anthrax—malignant oedema—braxy in sheep—Louping ill—Emphysematous gangrene (Black leg), Gas gangrene—Swine Erysipelas—Pasteurellosis (cattle, buffaloes, goat, sheep, swine, fowl and rabbit) Bacterial necrosis—Septicaemic affection of new born animals—Fowl typhoid and Bacillary white diarrhoea of chicks—Distemper in dogs and cats—Canine typhus—Influenza of horses—Ephemeral fever of cattle—African horse sickness—Rinderpest—Swine fever—Fowl pest—Ranikhet disease (pseudo fowl pest) Psittacosis—purpura haemorrhagica—Lamsiekte.

Acute Exanthematous Infectious Disease.

Pox (variola) Foot and Mouth disease—Vesicular stomatitis—coital exanthema.

Acute Infectious Diseases with Localisation in Certain Organs.

Strangles—contagious pleuro-pneumonia of cattle, horses and goats—Infectious anaemia of horses—Epizootic pneumonia in young animals.

Infectious Diseases with Special Involvement of the Nervous System.

Tetanus—Rabies—Aujesky's disease—Fowl paralysis—Equine encephalomyelitis. Circling disease.

Chronic Infectious Diseases.

Tuberculosis—Johnes disease—Actinomycosis—Actinobacillosis—Botriomycosis—Glanders—Ulcerative lymphangitis—Epizootic lymphangitis—Brucellosis—Bursattee—Bovine lymphangitis—Pseudotuberculosis of sheep.

Rickettsiosis in animals.

Infectious Diseases Caused by Protozoa.

Piroplasmosis including Theileriasis—Anaplasmosis—Leishmaniasis—Trichomoniasis—Hepatozoan canis—Bartonellosis—Trypanosomiasis (Surra, Nagana, Mal-de-caderas and dourine)—Spirochaetosis of fowls and dogs—Ringworm Mange—Warbles—Helminthiasis—Nasal granuloma—Coccidiosis.

Diagnostic Tests in Veterinary Practice with Biological Products.

Mellein test—tuberculin test—Johnin test—Precipitation test—Agglutination test—Compliment fixation test—Animal inoculation.

C. PREVENTION OF THE SPREAD OF DISEASE.

Isolation—quarantine—notification—prophylaxis and disinfection. Disinfectants—fresh air—wind—sunlight—heat—dry heat—moist heat—electricity—hot water—steam—chemical disinfection—perchloride of mercury—bleaching powder—lime—slaked lime—formaldehyde—coaltar—carbolic acid—cresol—Lysol—Pyrethum compound—Potassium permanganate—Fumigation—Sulphurous acid gas, chlorine, etc. Disinfection of stables—cow sheds, kennels, piggeries, etc., for mange; strangles, Influenza, Swine fever, Anthrax, Rinderpest, foot and mouth disease.

Disinfection of harness and clothing, etc.

Disposal of carcase—Cremation—Burial—chemical digestion.

Practical.—Applied laboratory technique connected with diagostic work. Use of diagnostic agents like Mallien, Tuberculin, etc.

POSTMORTEM EXAMINATION.

FOURTH YEAR.

The course shall consist of practical work having not less than 30 hours.

Conducting and recording and autopsies, collection, preservation and despatch of morbid material for laboratory examination.

Laboratory examination of morbid materials.

SURGERY INCLUDING SOUNDNESS, OBSTETRICS AND JURISPRUDENCE.

FOURTH YEAR.

The course shall consist of lectures and practical work having not less than 240 hours.

Affections of Bones.

Splint—sore shins—racing joint—ring bone—pyramidal disease—sessamoiditis—spavin—side bones.

Horn—fractures—shedding of the horn—fissure of the horn—malignant diseases.

Affections of Bursae.

Individual cases of affections of bursae.

Individual cases of affections of tendon sheaths.

Joints.

Contusions—sprain—open joint—septic arthritis—chronic synovitis of a joint—bogspavin—thoroughpin.

Affections of Joints.

Fore limb and hind limb.

Affections of Tendons and Ligaments.

Sprain and rupture of flexor tendons and suspensory ligament—sprain of the inferior sesamoidean ligaments—curb.

Affections of the Feet in Horses and Cattle.

Injuries—avulsion of the hoof—bruised sole—corns—nail bound—pricks in shoeing—picked up nail—thrush—canker—coronitis—quittor—sand crack—false quarter—seedytoe—keratoma—laminitis—dropped sole—navicular disease—brittle hoof—contracted feet—interdigital affections—deformity of the claws—foul in the foot.

Dog—tearing away of the nail—inflammation of the nail bed—sore pads—inter-digital cysts—eczema—foreign body in the foot—growing in of dew claws—tumours of the paws.

Affections of the Teeth.

Affections associated with temporary dentition—persistent temporary teeth—symptoms of teeth trouble.

Irregularities of teeth—molars—sharp mouth—shear mouth—wave-formed mouth—step-formed mouth—oblique mouth—premature wear of Teeth—smooth mouth—caries—fissures in teeth—dental tartar—alveolar periostitis—dental fistula—tumours on the teeth.

Affections of Lips and Cheeks.

Wounds—bites—twitch injuries—bit injuries—injuries from sharp teeth—foreign body in mouth—paralysis.

Affections of Tongue.

Strangulation—wounds—paralysis—fracture of hyoid bone—ranula.

Affections of Poll, Neck and Withers.

Poll-evil—yoke-gall—saddle-gall—fistulous withers—collar-gall—yoke tumours.

Affections of the Facial Sinus and Nasal Chambers.

Empyema of facial sinuses—foreign body in the nose—tumours in nasal chambers—linguatula taenioides in nasal chambers of dogs—oestrus ovis in sheep.

Chronic catarrh of the guttural pouches.

Sturdy in sheep and cattle.

Affections of Larynx and Trachea.

Tumours in larynx—foreign body in larynx—tumour in trachea—perforating wounds of trachea—foreign body in trachea—roaring.

Affections of Pharynx.

Wounds of pharynx—foreign body—parasites—retro-pharyngeal abscesses—tumours.

Affections of Eesophagus.

Wounds—choking—impaction of crop in birds—dilatation—diverticulum—stricture or stenosis—tumours pressing on oesophagus—fistula.

Affections of Salivary Glands.

Wounds - fistula—salivary calculus—sub-parotid abscesses—tumours.

Affections of Thorax.

Costal fistula—sternal fistula.

Affections of Abdominal Wall.

Significance of wounds—penetrating wounds—varieties.

Abdominal hernia—internal abdominal hernia—varieties—external abdominal hernia—varieties.

Affections of Rectum and Anus.

Congenital abnormalities—injuries of rectum and anus—abscess in the rectum—fistulae—varieties—stenosis of the anus and rectum—dilatation of the anus and rectum—prolapse of anus and rectum—varieties—paralysis of rectum and anus—anal adenitis of dogs.

Affections of Urniary Organs.

Epispadia and hypospadia—injuries to bladder—foreign bodies in bladder—paralysis of the bladder—inversion of bladder—prolapse of bladder—calculi—urethral and vesical—stricture of the urethra.

Affections of Male Genital Organs.

The penis and prepuce—balanitis—phimosis and paraphimosis—accumulation of smegma in urethral fossae—injuries to penis—tumours on prepuce—tumours on penis.

The testicles and scrotum—abnormalities—retention of testicles orchitis — epididymitis—tumours of testicles—hydrocele—varicocele—castration.

Affections of Female Organs of Generation.

Vaginal and vulval injuries—rupture of the perineum—recto-vaginal fistula—haematoma of vagina—cyst in vagina—tumours of vagina—wounds of uterus—white heifer disease—ovarian cysts—hysterectomy—ovarohysterectomy.

Mammary glands.—Abnormalities—congenital and acquired—occlusion of the ducts of teats—polypus in the sinus of duct of the teat—traumatic lesions—contusions and open wounds—milk fistula fissures or cracks on teats—congestion of mammary gland—overstocking—calculi—warts on teat—mammitis—conditions requiring surgical interference—mammary tumours.

The Eye

Affections of the appendages of the eye—warts on eyelids—wound of eyelids—ptosis—trichiasis—entropion—ectoropion—blepharitis—ankyloblepharon—symblepharon—stye or hordeolum—hypertrophy of the harderian gland—lachrymal fistula—obstruction of lachrymal duct—inflammation of lachrymal sac—affections of the eye—traumantic lesions of the eyeball—contusion—wound—burns—luxation—tumours—dermoid cyst—intraocular filariasis—extraocular filariasis—conjunctivitis—varieties of—keratitis—staphyloma—keratocele—opacities of cornea—iritis—iridectomy—choroiditis—panopthalmia—cataract—glaucoma—hydropthalmia—specific ophthalmia.

Affections of the Ear.

Wounds—abscesses—ulceration—paralysis of muscles–heamatoma—otorrhoea.

OPERATIVE SURGERY.

Controlling and securing animals for operation.

The different methods of destroying animals.

Suturing—materials used—methods of suturing—continuous interrupted, pin quill, mattress, czerny's, lembert's, buried.

The teeth—use of the tooth rasp and tooth shears—extraction and repulsion of teeth.

The tongue—amputation of.

The oesophagus—passing of probang—passing of stomach tube—oesophagotomy.

The trachea—tracheotomy.

The salivary glands–operation for salivary calculi in parotid ducts.

The head and neck—trephining the sinuses—amputation of the horn—operations for poll evil—yoke gall and fistulous withers.

The ear—operation for haematoma—plastic operation of ear in the dog.

The eye—operated for ectropion and entropion—puncturing the cornea, excision of eyeball, extirpation of the membrana nictitans.

The veins—phlebotomy—intravenous injections.

The forelimbs—excision of capped elbow—median, ulnar, plantar and digital neurectomy—tenotomy of the flexer tendons—amputation of claws or part of limb—firing for sprained tendons—firing for ring bone.

The hind limb—anterior and posterior tibial neurectomy—cunean peroneal tenotomy—firing for bone spavin and curb.

The foot—operations for sand crack, side bone and quittor.

The thorax—Paracentesis thoracis.

The abdomen—Paracentesis abdominis—laparotomy.

Puncture of the rumen—rumenotomy—operation for crop bound in birds.

Operations for hernia.

The male genital organs—passing the catheter—puncture of the bladder—urethrotomy and lithotomy—amputation of the penis—the different methods of castration—caponing of fowl.

The female organs of generation—passing the catheter--ovariotomy—hysterectomy and suturing the vulva—operations on the udder and teats.

The tail—amputation of.

Obstetrics.

The obstetrical anatomy—the pelvis and generative organs.

The obstetrical physiology—reproduction—development of foetus.

Pregnancy or gestation—the form of the pregnant uterus—the position of foetus in the uterus—the diagnosis of pregnancy.

The duration of pregnancy of the domestic animals, the number of foetuses in the domestic animals—twin pregnancy and its diagnosis.

Anomalies in fecundation, such as superfecundation, superfoetation—the wandering of the genital cells.

Hygiene of the pregnant animal—diseases associated with pregnancy—Pica, cramp, constipation, oedema, hydrops amnii, amaurosis, paraplegia and albuminuria.

The antepartum accidents—prolapse of the vagina—rupture of the prepubic tendon—hysterocele—antepartum rupture of the uterus—haemorrhage from the gravid uterus—abnormal retention and mummification of the foetus—sporadic abortion—contagious abortion—Normal parturition—physiology of parturition—normal parturition and its management—expulsion of foetal membranes and involution of the uterus.

The care of the new born animal.

Dystokia—equipment for obstetrical work—position—control—examination of dystokia—prevention of infection during the operation and general handling of dystokia.

Obstetrical operation—Mutation—forced extraction—embryotomy Laparo—hysterotomy and hysterectomy.

Maternal dystokia tumultous or precipitate labour, maternal dystokia, pelvic constriction—displacement or changed relations of the uterus—morbid alterations in the generative organs.

Foetal dystokia—abnormalities in the development and primary diseases of the foetus—foetal ascitis—anasarea—emphysema of the foetus—hydrocephalus—wry neck in the foal—monstrosities.

The development of normal foetus in abnormal positions.

Dystokia depending on the anterior presentation.

Dystokia depending on the posterior presentation

Dystokia in transverse presentations.

Accidents following parturition—retention of foetal membranes—post-mortem haemorrhage—rupture of the uterus, vagina, the perineum, the bladder, the rectum, the intestines and the diaphragm—vesico-vaginal fistula—haematoma of the vulva—eversion and prolapse of the uterus, the vagina, the rectum and the bladder.

Pathology of parturition—acute and chronic metritis—metro-peritonitis—vaginitis—Leucorrhoea—Parturient laminitis—tetanus acetonemia of the cattle.

Puerperal eclamptic diseases—Eclampsia in the mare, cow and bitch—milk fever.

Diseases and accidents of young stock.

Non-infectious diseases—general weakness—retention of the meconium—umbilical haemorrhage—pervious urachus—imperforation of anus—indigestion and diarrhoea.

Sterility—its causes and treatment.

Soundness and Veterinary Jurisprudence

Soundness and unsoundness—definition—warranty—insurance breeds of horses—description and distinguishing features of each—colour of the horses—measurement of horses—age of horses—systematic examination of animals—general observation, inspection from all sides—height and age—manipulaton and examination of all parts—auscultation of lungs and heart—tests for eye sight, wind and lameness.

Ailments and defects which constitute unsoundness—defects not necessarily constituting unsoundness—vices—crib-biting—wind sucking—weaving—shying—forms of certificates.

Veterinary Jurisprudence—responsibility for certificates—the giving of expert evidence—criminal cases—private cases—professional etiquette—Fees.

TEXT-BOOKS.

BIOLOGY.

Text-books:

1. Manual of Zoology by Borradaile.
2. A Class Book of Botany (Oxford University Press) by Dutta.

Reference books:

1. Zoology for Medical Students (Macmillan) by Graham Kerr, J. G.
2. Biology for Medical Students (Macmillan) by Hentschle, C. C. and Cook, W. R. I.
3. Text-book of Botany (University Tutorial Press) by Lowson, Sahni, B.
4. Organic Evolution (Macmillan) by Lull, R. S.
5. Animal Biology by Wolcolt, R. H. (McGraw Hill Book Co.)
6. Text-book of Zoology—2 Volumes (Macmillan) by Parker and Haswell.
7. Manual of Botany for India (Government Press, Madras) by Rangachari, K.

CHEMISTRY.

Text-books:

1. A Text-book of Organic Chemistry by Gosh and Bagchi.
2. General and Inorganic Chemistry by Durrent.

Reference books:

1. Text-book of Organic Chemistry by Wortham.
2. A brief course in Organic Chemistry by Fuson, Connor, Price & Snyder.
3. Inorganic Chemistry by Lowry and Cavell.
4. Theoretical Organic Chemistry by Cohen.
5. General Chemistry by Demming.
6. Smith's Inorganic Chemistry—revised and rewritten by Kendall.

ANIMAL HUSBANDRY—PART I (HANDLING AND SHOEING).

Text-books:

1. Practical Animal Husbandry by Miller and Robertson.
2. Art of Horse Shoeing by W. Hunting revised by A. R. Mattinson.

Reference books:

1. Animal Management (1933) prepared in the Veterinary Department of the War Office.
2. A text-book of Shoeing by Lungwitz and John H. Adams.

ANATOMY INCLUDING HISTOLOGY AND EMBRYOLOGY.

Text-books:

1. Anatomy of Domestic Animals by S. Sisson.
2. Essentials of Histology by E. S. Schafer.
3. Vertebrate Embryology by Shamway.

Reference books:

1. The Comparative Anatomy of the Domesticated Animals by A. Chauveau.
2. The Topographical Anatomy of the Horse by O. C. Bradley.
3. The Topographical Anatomy of the Dog by O. C. Bradley.
4. Text-book of Histology by Jordon.
5. Text-book of Histology by Maximov & Bloom.
6. Developmental Anatomy by Arey.

PHYSIOLOGY INCLUDING EXPERIMENTAL PHYSIOLOGY AND BIOCHEMISTRY.

Text-books:

1. The Physiology of Domestic Animals by H. H. Dukes.
2. Practical Physiological Chemistry by S. W. Cole.
3. Experimental Physiology by D. T. Harris.

Reference Books:

1. Manual of Veterinary Physiology by Major-General Sir F. Smith.
2. Essentials of Veterinary Physiology by D. N. Paton and J. B. Orr.
3. Starling's Principles of Human Physiology—Lovett Evans.
4. Applied Physiology—S. Wright.
5. Experimental Physiology by E. S. Schafer.
6. Text-book of Biochemistry—Cameron, A. T.

7. Mammalian Physiology—E. G. T. Liddell and Sir C. Sherrington.

8. A Laboratory Course in Physiology—Cannon, W.B.

ANIMAL HUSBANDRY—PART II (HYGIENE).

Text-book:

Veterinary Hygiene by R. G. Linton.

Reference book:

Veterinary Hygiene and the contagious diseases of domestic animals by M. Klimmer.

PARASITOLOGY.

Text-books:

1. Medical Parasitology and Zoology by R. W. Naus—1944.
2. Veterinary Helminthology and Entomology by H. O. Monnig.

Reference-books:

1. Manual of Helminthology, Medical and Veterinary by H. A. Baylis.
2. Clinical Parasitology by C. F. Craig and F. C. Faust—1943.
3. Protozoology—A manual for Medical Men, Veterinarians and Zoologists by C. M. Wenyon in 2 Volumes—1926.
4. Medical Entomology by R. Matheson.
5. Helminth Parasites of the domesticated animals in India by G. D. Bhalerao.
6. A Text-book of Medical Entomology—Paxton and Craig—1913.

PATHOLOGY AND BACTERIOLOGY INCLUDING IMMUNOLOGY.

Text-books:

1. Text-book of Veterinary Bacteriology and Pathology by Gaiger and Davies.
2. Introduction to Practical Bacteriology by Mackie and McCartney.

Reference books:

1. Manual of Bacteriology by Kelser.
2. Principles of Bacteriology and Immunology by Topley and Wilson.

3. Special Pathology and Therapeutics of the Diseases of Domestic Animals, Volumes 1 to 3 by Hutyra and Marek.
4. Text-book of Pathology by Mac Callum.
5. Text-book of Pathology (General and Special) by Beattie and Dickson.
6. Text-book of Pathology by Boyd.
7. Text-book of Pathology by Muir.
8. Veterinary Post-mortem Techinque by Crocker.

PHARMACOLOGY INCLUDING MATERIA MEDICA AND PHARMACY.

Text-book:

Veterinary Therapeutics by Wallis Hoare, revised by Greig.

Reference books:

1. A Text-book of Pharmacology and Therapeutics by A. R. Cushny.
2. Practical Veterinary Pharmacology, Materia Medica and Therapeutics by Howard Jay Milks.
3. A Manual of Pharmacology by Sollmann.

ANIMAL HUSBANDRY—PART III (NUTRITION AND DAIRY SCIENCE).

Text-books:

1. Animal Nutrition and Veterinary Dietetics by R. G. Linton and Grahame Williamson.
2. Milk Production and Control by Clunie Harvey and H. Hill.

Reference books·

1. Animal Nutrition by Armsby.
2. Care and Handling of Milk by H. E. Ross, 1927.
3. Milk and Milk Products by C. H. Eckles, Combs and Macy-1929.
4. A Laboratory Manual of Milk Inspection by A.C. Aggarvala.
5. Feeding and Milking of Cows by A. C. Aggarvala.
6. The Scientific Feeding of Animals by Kellner.
7. Feeds and Feeding by Morrison.
8. A Hand-book of some South Indian Grasses by K. Rangachari.

MEDICINE INCLUDING THERAPEUTICS AND TOXICOLOGY.

Text-book:

Special Pathology and Therapeutics of the Diseases of Domestic Animals, Volumes 1 to 3 by Hutyra and Marek.

Reference books:

1. Encyclopaedia of Veterinary Medicine, Surgery and Obstetrics by G. G. Woolridge.
2. Diseases of Animals in Tropical Countries by Edmund and Walker.
3. Clinical Diagnostics by Dr. B. Malkmus.
4. Diagnostic Methods in Veterinary Medicine by Geo. F. Boddie.
5. Animal Diseases of South Africa by M. W. Henning, Volumes I and II.
6. Veterinary Toxicology by Landers.

SURGERY INCLUDING SOUNDNESS, OBSTETRICS AND VETERINARY JURISPRUDENCE.

Text-books:

1. Dollar's General Operative and Regional Surgery, revised by J. J. O'Connor.
2. Examination of Horses for Soundness by Macgregor.
3. Veterinary Obstetrics by W. L. Williams.

Reference books:

1. Encyclopaedia of Veterinary Medicine, Surgery and Obstetrics by G. G. Woolridge.
2. Surgical Diseases of the Dog and Cat by Hobday.
3. Sex Hygiene in Cattle by W. W. Williams.
4. Surgical Anatomy by T. Sharejones, Volumes I and II.

ANIMAL HUSBANDRY—PART IV (GENETICS AND BREEDING.)

Text-book:

Breeding and Improvement of Farm Animals by Rice.

Reference-books:

1. Animal Genetics by Dr. Crew.

2. Farm Livestock of Great Britain by Robert Wallace and J. A. S. Watson.

3. Methods of Livestock Improvement by T. Murari.

4. Livestock of Southern India by R. W. Littlewood.

5. Animal Breeding by Lawrence M. Winters.

6. Farm Animals, their breeding, growth and inheritance by John Hammond, School of Agriculture, University of Cambridge.

7. Definition and Characteristics of seven breeds of cattle of All-India Importance. Misc. Bulletin 27. Imperial Council of Agricultural Research, 1939.

MEAT INSPECTION.

Text-book:

Principles and Practice of Meat Inspection by G. Leighton.

Reference book:

Text-book of Meat Hygiene by R. Edelman and translated by J. R. Mohler and A. Eichorn.

APPENDIX XXIII.

SYLLABUSES FOR THE B.Sc. (TECH.) DEGREE COURSE.

(a) Chemical Engineering.

(1) GERMAN.

Reading and translation for the purpose of giving facility in the interpretation of German books and papers in Science and Technology.

The Examination will be a test of the capacity of the student to carry out free translation into English of German Literature in Chemistry and Chemical Technology.

(2) PRACTICAL MATHEMATICS

Dimensional analysis:—Units and dimensions. Hospitalier notation for the conversion of units. Dimensionless numbers and their use in chemical engineering design. Dimensional similitude. Molal units.

Numerical analysis:—Determination of empirical formulas with two and three constants.

Types of graphical representations :—(a) Rectangular co-ordinates. Scale factors. Use of semi-log and log-log scales for exponential and power functions. Scale modifications to avoid trial and error computations. Special scales, as for vapour pressure relationships. (b) Trilinear systems of co-ordinates. Calculations involving the composition of a mixture of two or more ternary compositions ($x+y+z=k$). Revival of spent acids.

Graphical computations:—Functional scales. Slide rules and Net Work charts. Their setting up and use. Alignment charts or nomograms. Simple equidistant parallel scales. General case of three parallel scales. Compound nomographs with pivot lines. N charts, Fan charts. Exercises in setting up nomographs, *e.g.*, for friction drop in pipes, analytical calculations from titration readings. Heat transfer co-efficients, gas densities, etc.

Graphical methods of integration and differentiation.

Evaluation of observations. Absolute and relative errors. Simplified methods of arithmetical computations.

Differential equations. Solutions of ordinary differential equations and some of their applications.

(3) APPLIED PHYSICAL CHEMISTRY I.

Reactions in homogeneous systems:—Free energy and Thermodynamic criteria of chemical equilibria. Variation of equilibrium constants with temperature. Methods of investigation of chemical equilibria. Technical gas reactions.

Factors influencing velocity of reactions; temperature co-efficient of velocity constants; chain reaction.

Catalysis: Theory and application:

Heterogeneous systems:—Technical applications of phase rule. Binary systems, eutectics, solid solutions and compounds. Thermal analysis and alloy systems.

Applied Electro-Chemistry:—Hydrogen ion concentrations, Buffer solutions, Indicators, Reversible cells; Methods of measurement of pH. and its control in industrial processes.

Decomposition potential, polarisation, over-voltage. Electrolytic oxidation and reduction. Corrosion of metals.

Electrometric methods—Gravimetric electroanalysis, conductometric and potentiometric titrations; Polarography.

Principles and practice of Electrodeposition and electro refining. Fused electrolytes.

Colloid Chemistry:—General properties of colloid systems. Determination of particle size. Electrokinetics. Peptisation and protective action. Gels. Thixotropy. Colloidal Electrolytes, Donnan equilibrium, physical chemistry of soap solutions. Disperse systems in gases.

Surface Chemistry:—Orientation at interfaces, wetting and detergency. Chemistry of wetting agents, Textile assistants, foamers, and flotation processing agents. Lubricants and lubrication.

Adsorption: Physical and chemi sorption, Zeolites and allied products.

Emulsions : Emulsification and demulsification.

Applications of colloidal chemistry in technology of Rubber, Ceramics, leather, &c.

Photo Chemistry:—Fundamental laws. Photo chemical reactions. Technical photo chemical processes.

(4-A) INDUSTRIAL GEOLOGY.

The occurrence of mineral deposits in Nature:—Elements of petrography and stratigraphy with particular reference to India. Mode of occurrence of principal minerals like abrasives, asbestos, Bauxite, Building stones, chromite, Clays, Copper, Gold, Iron, Natural refractories, Manganese, Mica, Monazites, Sulphur, etc. Prospecting and Mining in India.

Testing and grading of Minerals:—Principal physical properties of minerals; Mohr's scale.

Elements of crystallography:—Symmetry, planes and axes of symmetry. Laws of crystallography. Systems of crystal notations. The seven crystal systems.

Identification of more important minerals with simple lenses and polarising microscope.

(4-B) INDUSTRIAL ORGANIC CHEMISTRY.

Sugars, Starches and Cellulose:—Their occurrence, physical and chemical characteristics. Derivatives of Starch and Cellulose, Esters, ethers, etc.

Natural Colouring matters:—Chlorophyll, Carotenoids, Anthocyanins and Porphyrin.

Proteins:—Classification. Occurrence. Methods of isolation. Physical and chemical properties.

Vitamins and Hormones:—Their occurrence, properties and significance in nutrition.

Resins:—Natural resins. Classification, origin and properties. Thermal processing. Compatibilities. Gums and gum resins.

Tannins:—Classification. Occurrence. Methods of preparation Industrial uses. Synthetic tannins.

Essential Oils and Terpenes:—Occurrence. Chemistry—methods of isolation and industrial uses.

Alkaloids:—Classification. Occurrence. Chemistry—methods of preparation. Properties.

(5) GENERAL ENGINEERING I.

PART A.

Engineering Materials and Construction of Works.

Properties of Materials:—Physical and chemical properties of materials, their choice for specific purposes. Elements of

Engineering design in steel, concrete, and timber for simple plants and equipments.

Elements of fabrication, casting and foundry practice and simple workshop practice.

Planning and design of factory buildings—Lighting, ventilation, heating, drainage and sanitation. First aid and provision for fires, etc. Elements of design for foundations for plants and buildings. Ferro concrete constructions, chimneys, tanks and special structures.

PART B.

Fuel Technology.

Solid Fuels:—Wood and charcoal; peat, lignite and coals. Typical Indian coals. Distillation of coal and coking, carbonisation, assay of coal, Briquetted coal, Pulverised coal and coal burning methods.

Liquid Fuels:—Crude petroleum and its distillation. Heavy fuel oil. Hydrogenation of coal. Petrol, Benzol, and alcohol fuel mixtures for I. C. engines. Physical and Chemical tests for fuel oil, Flash points, etc. Oil burners.

Gaseous Fuels:—Natural gas; Composite industrial gases. Illuminating gas, Coke-oven gas, Blue Water gas, and Carburetted water gas, Producer gas: Gas producers, and type of their design. Gas burners.

Sampling and Analysis of Fuels:

Coal and Oil: Ultimate and proximate analysis.

Gases: Technical gas analysis.

Heat value of Fuels:

Calorimetry:—(*a*) Bomb calorimeters for solids and heavy liquids. (*b*) Gas calorimeters for gas. (*c*) Use of above for liquid fuels. Sources of errors and corrections. Calculations of heat values: L.H.V. and H.H.V.

Control of Combustion:—Exhaust and flue gas sampling and analysis. Automatic flue gas analysis: CO_2 recorders. Combustion calculations. Heat losses in flue and exhaust gases. Surface combustion. Smoke determination and control.

(6) GENERAL ENGINEERING II.

PART A.

Power Generation and Transmission.

Properties of steam, principles of modern boiler plants, their equipment and accessories. Use of economisers and super-heaters—Testing of boilers.

Theory of heat engines, steam and internal combustion engines and steam turbines. Their operation and applications.

Mechanical power transmission; shafting, belting, gear and chain driving, lubricants and lubrication.

PART B.

Electrical Plants and Machinery.

D. C. generators, motors and starting equipments for the same. Storage batteries. Principles of alternating currents, measurements of power and power factor, single phase and poly phase supply. Principles of alternating current, generators, motors and starting devices. Use of transformers, rotary converters and rectifiers. Choice of A.C. and D.C. motors for specific drives. Electrical distribution and electrical tariffs in factories.

(7) GENERAL CHEMICAL ENGINEERING.

Scope of Chemical Engineering. Effects of change of scale. Principles of process development.

Fluid flow, its nature and measurement with different types of meters. Transport of fluids and solids.

Heat transmission. Laws of heat transfer. Sources of heat. Furnaces and kilns; Heat exchangers, Evaporators.

Material Transfer. Laws of diffusion. Extraction, Crystallisation, Absorption, Distillation, Air conditioning, Drying.

Mechanical Separation: Sieves, Classifiers, centrifuges, cyclones, Filtration.

Mechanical Processing: Crushing, grinding and mixing.

Materials of construction of chemical plants, and general principles of plant design.

(8) DRAWING I.

Plane Geometry:—Use of instruments, Proportional division of a line, construction of plain and diagonal scales, regular polygons, ellipse and parabola.

Solid Geometry:—Principles of projection. Projection of solids placed in simple positions, new plans and elevations and plane sections of solids.

Machine Drawing:—Use of scales. Forms, proportions, and use of bolts, studs, setscrews and nuts, split pins, and keys. Simple types of cottered joints, bearings, hangers, wall brackets, Shaft couplings, belt and rope pulleys, stuffing boxes, valves and pipe joints.

Sketching:—Free hand sketching of machine details from models and machine parts. Lettering and dimensioning.

GROUP C.

(1) Industrial chemical analysis, covering: Ores, Metals, and alloys, oils and soaps, water, and analytical tests on chemicals of commerce.

(2) *Engineering Laboratories*:

Mechanical Engineering: Strength of materials, performance of oils, gas and steam engines, Boiler Trial, Fuel testing, Performance of pump and measurement of fluid flow.

Electrical Engineering: Measurement of A. C. and D. C. power, Study of motors and motor starters, Efficiency tests on A. C. and D. C. motors.

Workshop: Carpentry: Simple joints, Construction of simple models. Chipping, filing, and simple fitting work. Lathe work: Simple machineshop processes. Smithy and Foundry work.

(9) GENERAL CHEMICAL TECHNOLOGY.

(a) *Analytical Methods in Industrial Chemistry*:

Sampling, indicators, Spot-analysis, Assaying, Micro-analysis, Chromatography, etc.

(b) *Inorganic Technology*:

1. Industries based on (i) *Common Salt*, Hydrochloric Acid, Sodium Sulphate, Sodium Sulphide, Sodium Carbonate, Sodium, Caustic Soda, Chlorine, Bleaching Powder, Potassium and Sodium Chlorates, Aluminium Chloride. (ii) *Sulphur and Sulphur Compounds*, Sulphur, Sulphuric Acid, Sodium Hydrosulphite, Sodium Sulphite, Sodium Thiosulphate, Alums. (iii) *Limestone, Clay and Sand*, Glass and Silica ware, Safety glass, Sodium Silicate, Lime, Cement, Earthenware, Ceramic raw materials, General

method of manufacture. Glazed Pottery, Fireclay goods, Faience.

2. *Industrial Gases:*—Hydrogen and Oxygen, Synthetic Ammonia and its Uses, Synthetic Nitric Acid, Carbon Dioxide, Carbon Monoxide, Rare Gases, Industrial utilisation of gases under high pressure.

3. *Metallurgical Processes:*—Nickel, Copper, Precious Metals, Electro-metallurgy, Sodium and Sodium Peroxide, Aluminium and Magnesium.

4. *Borates and Phosphates:*—Phosphorus, Industrially important Phosphorus Compounds, Superphosphates and Fertilisers.

5. Pigments and Paints : White Pigment and extenders, Blank Fixe, Lithopone, White Lead, Zinc Oxide, Titanium Oxide, Ochres, Lakes, Monastral Blue, Paints and Varnishes.

(c) *Technology of Water and Water Analysis.*

(d) *Organic and Biochemical Industries:*

1. Oils, Fats, and Waxes, Refining and Hydrogenation, Soap boiling, Glycerin.

2. Cellulose, Paper, Artificial Silk, Cane Sugar; Starch, Glucose.

3. Coal, Distillation of Coal Tar, Gas, Coke and Tar. Low Temperature Carbonisation, Hydrogenation of Coal.

4. Explosives; Nitro-glycerin, Nitro-cellulose, Pyrotechnics, Chemical warfare.

5. Oil, Shale and Petroleum.

6. Dyestuffs; Vat dyes, Sulphide dyes, Dispersed dyes, Intermediates and their manufacture, Unit operation of Halogenation, Nitration, Reduction, Sulphonation, Alkali fusion, Oxidation, Carboxylation.

7. Plastics and Rubber. Phenol Formaldehyde Resins, Casein Formaldehyde Resins, Urea Formaldehyde Resins, Glyptal Resins, Polymerisation Resins.

8. Industrial Solvents. Alcohol, Acetone, Acetaldehyde, Ethyl Alcohol, Acetic Acid, Non-inflammable Solvents, Synthetic Methanol.

9. Fine Chemicals. Essences and Cosmetics, Analytical Chemicals, Photographic Chemicals, Disinfectants, and Antiseptics, Pharmaceutical products, Anaesthetics, ether and Chloroform. Antipyretics, Hormones and Vitamins.

10. Fermentation Industries: Alcohol, Citric Acid, etc.

11 Food Industries.

12. Leather, Gelatin, Glue.

(10) INDUSTRIAL ORGANISATION AND ECONOMICS.

Elements of Economics:—Production, value, exchange, distribution and money.

Business Organisation and Finanee:—Partnership and companies. Raising of capital in various forms. Laws of Commerce in India.

Industrial Administration and Laws:—" Scientific management" movement; industrial psychology, Labour problems. Partnership, Wage systems, production control. Safety methods and welfare work.

Factory legislations: Contracts of service and apprenticeship, their formation and discharge and the duties of master and servant thereunder. Employers' liability at common law. Factory Acts on Insurance, Wages, Hours of employment, Labour disputes, Dangerous trades, etc.

Cost Accounting and Factory Control:—Costs of raw material, Structures. Equipments and their erection, power, labour, maintenance and repair. Capital, depreciation, interest, etc., Preconstruction cost accounting.

Factory records and book-keeping. Balance sheet. Graphical and Statistical control. Purchasing and stores organisation, Marketing, Patents, Laws.

(11) CHEMICAL ENGINEERING I.

Elements of Surveying and Planning of factory lay-out.

Theory of structures in steel and concrete, and timber, applied to supporting structure for chemical plant. Elements of machine design as applied to chemical plants, design and construction of simple

chemical units, such as tanks, bunkers, reaction vessels, and autoclaves for low, medium and high pressure equipments.

Principles of erection of heavy plants and equipments, their drives, their lay-outs and use of handling facilities like gantries; cranes, etc.

Mechanical Preperties. Theories of Corrosion and methods of prevention. Ferrous materials: Pure iron, Steels and their heat treatment, and Cast Irons. Non-ferrous materials: Copper, Nickel, Aluminium, Lead, etc., and their alloys. Non-metallic Materials: Chemical Stoneware, Wood, Plastics, Rubber, Cements and Lutes.

Choice of materials for specific conditions. General principles of equipment design.

(12) CHEMICAL ENGINEERING II.

Thermodynamics of Internal Energy, Heat content, Free energy, and entropy. Heats of formation of compounds.

Chemical Thermodynamics. Energy changes and equilibria. Nernst's theorem. Application to specific technical reactions.

Heterogeneous Equilibria. Equilibrium in salt systems and melts. Ternary and higher systems in metal alloys. Elements of metallography.

Chemical Spectroscopy.

Technical Measurements and Control:—Principles of Industrial Instrumentation, Indication and Control Equipments. Specific Variables and their Control. Pressure, Temperature and weight.

Fluid Flow:—Fluid dynamics, Bernoulli's theorem, Mechanism of Flow, Reynold's number, Friction losses, Viscous and Turbulent flow of compressible and non-compressible fluids, Fanning's Curve. *Flow Meters*:—Pitot, Orifice, Venturi, Weir, Area and other Meters. Process control—Automatic methods with corrections for different types of Lags.

Industrial Stoichiometry:—General Principles, material and energy balances, collection of data and methods of computation. Illustrative problems in Fuel Technology and other Chemical Industrial calculations.

(13) CHEMICAL ENGINEERING III.

Movement of liquids and gases by means of pumps, blowers, etc. Pipelines and fittings. Compressors and vacuum pumps.

Transport of solids by mechanical means such as conveyors, elevators, trucks, etc.

Containers for gases, liquids and solids.

Unit plants for:

(*a*) Size reduction, mixing and kneading.

(*b*) Separation of solids from solids. Screens, hydraulic classifiers, hindered settling, floatation, Magnetic and electric separation. Extraction and crystallisation.

(*c*) Separation of solids from liquids and gases. Sedimentation, thickeners, Centrifuges. Filtration, Industrial filters and filtration theories.

(*d*) Separation of gases from gases. Condensation, Absorption, and Adsorption. The design and performance of packed and plate columns.

(*e*) Conditioning of gases and air. Humidity charts, Humidifiers and dehumidifiers.

(14) CHEMICAL ENGINEERING IV.

General:—Conduction: Flow of heat through furnace walls. Convection: film and overall coefficients of heat transfer, and correlation formulas. Design of surface condenser. Heat exchangers, single and multiple pass. Radiation. Fundamental laws, simplified equations for radiation.

Industrial Heating:—Gas flow in furnaces and friction losses in flues and conduits. Heat transfer in furnaces. Practical industrial furnace design, construction and operation. Elements of industrial electrical heating.

Industrial refrigeration:—General principles, vapour compression, absorption and other mechanical refrigerators, coefficients of performance. Choice of vapours for commercial refrigerators.

Unit plants for:

(*a*) Evaporation processes: principles of evaporator design. Single and multiple effects, and vapour recompression systems.

(*b*) Distillation processes: Vapour equilibrium relationships. Distillation of mixtures with one, two, three or more volatile components. Steam distillation. Sublimation.

Rectifying columns, single and multiple columns. Azeotropic distillations.

(*c*) Drying processes. Mechanism of air drying. Commercial drier equipments.

(*d*) Chemical type processes. Homogeneous and Heterogeneous reactions, Nitration, Sulphonation, halogenation, etc.

(15) DRAWING II.

Detailed and Assembly drawings. Sketching and preparation of working drawings for simple chemical plant units. Project or Erection drawing. Tracing and preparation of blue prints.

(16) DESIGN OF FULL CHEMICAL PLANT (DISSERTATION).

Questions will be set on the design of a complete Chemical Manufacturing Plant or of chemical plant units and on critical reports covering Technical subjects. These questions will be distributed to the candidates three months before the Final Examination in Part II.

The questions will be a test on the ability of the candidates to tackle a practical problem in a suitable manner and in the same way as might be expected of him if he were in the service of a large firm and were required to report upon a new manufacturing proposal.

It is recommended, though it is not essential, that the answers be typewritten. The answers must be made upon foolscap paper, and the necessary drawings on high class drawing paper of convenient size, if blue prints are not submitted. When detailed or working drawings are asked for, all mechanical details of the construction must be clearly shown, so that the drawings could be used in the workshops for fabrication.

Full references should be given to the sources of information, which should all be *from published literature only*.

Group C.

Practical Courses in Chemical Engineering, consisting of a selected number of experiments, covering:—

1. Physical and Chemical Testing of Materials of Construction.
2. Fluid Flow: its nature, and Measurement with Different Types of Meters.
3. Transport of Fluids: Performance and Efficiency Tests on Equipments.

4. Size reduction and mixing; Grindability Tests, Performance of Crushing and Grinding Equipments.
5. Classification and Concentration of Solids: Elutriators, Air Separators, Wilfley Table, Floatation Cell, Leaching and Extraction.
6. Filtration: Pressure and Vacuum Filtration, Compressibility of Cakes, Economic Operation of Filtration.
7. Heat Transfer Measurements: Heat Exchanger, Efficiency of Condensers. Boiler Tests.
8. Performance Tests on Stills, Evaporators, Fractionating columns, etc.
9. Absorption Studies: Simple Tube and Packed columns, Determining Coefficients of Material Transfer and H.T.U. Pressure Drop and Flooding in Packed Columns.
10. Drying Tests: Air and Vacuum Drying.
11. Semi-scale preparations.

(c) Textile Technology.

PART I—GROUP A.

(2-A) THEORY OF MACHINES AND TEXTILE MECHANICS.

Theory of machines: Analysis of plane, spheric and screw motions. Lower and Higher Pairing. Velocity and Acceleration diagrams. Simple and Compound gear trains. Forms of wheel teeth. Screw motions. Belting. Study and design of Cams and Oscillating levers. Dynamics of machines. Turning movement. Diagrams and Balancing.

Textile Mechanics: Opener and scutcher-fed motion cones, winding, flyer frame winding, ring frame winding, roller weighting, power for spinning machines, weft and warp winding, slay movement, shedding, picking, taking up and let-off motions. Power for the looms. Textile machine drives.

(5) GENERAL ENGINEERING I.

PART A.—*Engineering Materials and Construction of works.*

Properties of Materials:—Physical and chemical properties of materials, their choice for specific purposes. Elements of Engineering design in steel, concrete, and timber for simple plants and equipments.

Elements of fabrication, casting and foundry practice and simple workshop practice

Planning and design of factory buildings—Lighting, ventilation, heating, drainage and sanitation First aid and provision for fires, etc. Elements of design for foundations for plants and buildings. Ferro concrete constructions; chimneys, tanks and special structures.

(6) GENERAL ENGINEERING II.

PART A.—*Power Generation and Transmission.*

Properties of steam, principles of Modern boiler plants, their equipment and accessories. Use of economisers and super-heaters—Testing of boilers.

Theory of heat engines, steam and internal combustion engines and steam turbines. Their operation and applications.

Mechanical power transmissions; shafting, belting, gear and chain driving, lubricants and lubrication.

PART B.—*Electrical Plants and Machinery.*

D. C. Generators, motors and starting equipments for the same. Storage batteries. Principles of alternating currents, measurements of power and power factor, single phase and poly-phase supply. Principles of alternating current generators, motors and starting devices. Use of transformers; rotary converters and rectifiers. Choice of A.C. and D.C. motors for specific drives. Electrical distribution and electrical tariffs in factories.

(8) DRAWING I.

Plane Geometry:—Use of instruments, Proportional divisions of a line, construction of plain and diagonal scales, regular polygons, ellipse and parabola.

Solid Geometry:—Principles of projection. Projection of solids placed in simple positions, new plans and elevations and plane section of solids.

Machine Drawing:—Use of scales. Forms, proportions, and use of bolts, studs, setscrews, and nuts; split pins and keys. Simple types of cottered joints, bearings, hangers, wall brackets, Shaft couplings, belt and rope pulleys, stuffing boxes, valves and pipe joints.

Sketching:—Free-hand sketching of machines and machine parts. Lettering and dimensioning.

GROUP B.

(4-C) GENERAL TEXTILE CHEMISTRY I.

General properties of textile fibres, their classification and identification. Chemical properties of the important textile fibres. Estimation of cotton, wool and silk in mixed fabrics. Outlines of manufacture of rayons.

Water for textile purposes. Sequence of processes in bleaching, dyeing, finishing and printing. Scouring and bleaching agents. Mordants. Classification of dyes. Sizing materials—their properties—specifications for use in textile industry.

(17) PREPARATION AND SPINNING I.

Description and working of Knife roller, Macarthy and Saw Ginning Machines, Hopper Bale Breakers, Hopper Feeders, Crighton, Buckley, Porcupine, Exhaust, Youlten Openers; Pneumatic Conveyers, Dust Trunks, Scutchers, Flat and Shirley Carding Machines, Drawing Frames, Slubbing, Inter, Roving, and Jack Frames Ring Spinning Machine, Doubling, Reeling, Bundling and Baling Machines.

Method of clothing cards, stripping and grinding of cards and fillets. Roller-Covering. Principles of Drafting. Setting of Machine parts, calculations relating to gearing speeds, production and efficiency of machines, power consumption, etc.

(18) PREPARATION AND WEAVING I.

Description and working of Bobbin, Cheese, Cone and Pirn Winding Machines, Beam Warping Machine, Slasher-Sizing Machine, Hot Air Sizing Machine, Drawing in and Twisting.

Sizing recipes. Method of preparing size mixing, size mixing apparatus.

Description and working of power looms with plain and twill motions; Healds and Reed calculations. Calculations relating to gearing, speeds, production, power consumption and efficiency of machines.

(19) FABRIC STRUCTURE AND DESIGNING I.

Plain weave and its modifications. Twill and derivatives including Satins, Diamond and kindred weaves, construction of Crepes, Spiders, Grecians, Mock Lenos, Dice, Damask, Bedford Cords, Welts and Pique, Backed Fabrics and Fustians. Terry Pile Fabrics, Plain and Fancy Double Cloths.

(20) GENERAL TEXTILE TECHNOLOGY.

Textile Fibres:—Fibres used in the manufacture of yarn for weaving, structure of cotton, waste cotton, silk, spun silk, wool, art silk, linen and bast fibres, determination of fibre length. Physical properties of Fibres, their quality and determination. Significance of test results. Moisture content of fibres. Effect of humidity on strength and elasticity.

Sequences of procesees:—Sequence of processes used in the production of yarn and cloth from cotton, silk, wool, rayon and bast fibres.

Cotton cultivation :—Geographical position of the cotton fields of the world. Area within which cotton can be commercially cultivated. Physical conditions necessary to its growth and their influence upon the character of the fibre with special reference to Indian conditions. General procedure of cultivating and harvesting of cotton. Time of sowing and picking of cotton. Damage to crops, cotton acreage and yield per acre. General characteristics of the chief varieties of cotton. Grading of cotton in relation to their values and spinning properties. Methods of selecting cotton when purchasing. The defects usually existing and their effect upon the value. Commercial purposes of mixing cotton.

Sericulture:—Mulberry cultivation, Silkworm rearing.

Raising of wool:—Sheep breeding, wool shearing and sorting

Textile testing:—Systems of numbering cotton, worsted, woollen, Silk, Rayon, Linen, Folded, Grandrelle and Fancy Yarns and their conversions. Average and resultant yarn. Principles of Textile, Testing Machines.

Statistical Methods:—Precision and Accuracy—Classification of Experimental Variations—Mode, Median and Mean——Standard Deviation—Method of Computing Deviation—Probability Table and its use—Standard Error—Significance Level—Significance of Differences—Comparison with a Standard—Significance of Standard Deviations—Correlation of Values—Mathematical Treatment of Data of Tests—Nomograms for Cost Analysis.

Group C—Practical Tests.

TEXTILE TESTING.

Stapling of fibres, microscopical examination of fibres, Testing of yarn for count, strength, elasticity, twist regularity, moisture and

cleanliness. Comparison of strength of threads as shown by lea, single thread, and ballistic yarn test. Testing of cloth. Identification of fibres. Estimation of Cotton, Wool and Silk in mixed fabrics.

Action of Chemicals on Textile Fibres:—Action of Acids, Alkalies, Oxidising Agents, Salts, etc., on Textile Fibres.

PREPARATION AND SPINNING I.

Setting of various parts of spinning machinery. Working of machines.

PREPARATION AND WEAVING I.

Setting of various parts of weaving machinery. Working of machines.

PART II—GROUP A.

(10) INDUSTRIAL ORGANISATION AND ECONOMICS.

Elements of Economics:—Production, value, exchange; distribution and money.

Business Organisation and Finance: Partnership and companies. Raising of capital in various forms. Laws of Commerce in India.

Industrial administration and Laws:—"Scientific management" movement; industrial psychology, Labour problems. Partnership, Wage systems, production control. Safety methods and welfare work.

Factory legislations: Contracts of service and apprencticeship, their formation and discharge and the duties of master and servant thereunder, Employer's liability at common law. Factory Acts on Insurance, Wages, Hours of employment, Labour disputes, Dangerous trades, etc.

Cost accounting and factory control:—Costs of raw materials structures, equipments and their erection, power, labour, maintenance and repair. Capital, depreciation, interest, etc. Pre-construction cost accounting.

Factory records and book-keeping, Balance Sheet, Graphical and Statistical control. Purchasing and stores organisation, Marketing, Patents, Laws.

(21) PREPARATION AND SPINNING II.

Sliver Lap and Ribbon Lap machines, Nasmith Combers, Mule Spinning, Thread extractor and Roving waste opener. General outlines of waste cotton spinning machinery, and Heilmann comber. Principles of drafting, setting of machine parts, calculations relating to gearing, speeds, production and efficiency of machines, power consumption, etc.

(22) PREPARATION AND WEAVING II.

Hank sizing, Ball warp sizing, Sectional warping. Scotch Dressing, Yorkshire Dressing, Scotch dry Taping machines.

Description and working of Dobbies, Jacquards, Drop Box Looms, Circular Box Looms, Looms for weaving special fabrics and automatic looms, Terry Reed Motion, Jacquard Harness Building, Card Cutting, Card Lacing. Calculations relating to gearing, speeds, production, power consumption and efficiency of machines.

(23) FABRIC STRUCTURE AND DESIGNING II.

Leno and Gauze Weaves, Fancy Damasks, Brocades, Figured Repp Quiltings, Patent Satin, Matelasee, Masselles, Extra Warp and Extra Weft Figuring.

Elements and Principles of ornaments. Influence of materials and structure upon ornament. Planning various types of ornament. Preparation of painted sketches for textiles. Treatment of natural and conventional forms.

Adoption of design to the scale and quality of texture. Designing patterns suitable for weaving on Jacquard machines. Economical distribution of colours in a design.

(24) GENERAL TEXTILE CHEMISTRY II.

Methods of Bleaching, Dyeing, Printing and Finishing of cotton yarn and cloth. Outlines of bleaching and dyeing of wool, silk and rayon.

Testing the fastness of dyed materials. Identification of the class of a dyestuff. General Principles of Singeing machines, Boiling Kiers, Washing machines, Hydro-Extractor, Electrolyser for Sodium Hypochlorite, Cloth Squeezing machines, Scutcher, Drying machine, Jiggers, Cheese dyeing machine, Mercerising machine, Water and Starch Mangles, Damping machines, Calendering machines, Measuring and Folding machines, Cloth printing machines.

(25) CLOTH ANALYSIS AND COSTING OF YARN AND CLOTH.

The effect on the appearance and strength of cloth due to alterations in structure. The effect of twist, high and low temperatures, and moisture on the strength and appearance and the behaviour of threads and fabrics.

Costing of yarn, Quantities Calculation, Warp and Weft Contraction, Wage Calculations, Yarn Prices, Distribution of Overhead Charges.

(26) TEXTILE ENGINEERING.

Selection of site for textile factories, Selection of machinery, Layout of buildings and machinery. Lighting, Heating, Ventilating and Humidifying of factories. Driving systems for machinery. Cost of constructing mills. Preparation of financial statement.

Mill Organisation:—Method of selecting, sampling and purchasing raw cotton. Principles of cotton mixing.

Training of operatives, Repairs and renewals of machines, Fixing of wages.

(26-A) DRAWING II.

Machine Drawing:—Drawing of textile machinery and their parts.

(27) COTTON INDUSTRY AND TRADE.

Important varieties and yield of cotton crops in the world. Important cotton markets in the world with special reference to Indian markets and organisation. Statistics relating to cotton mills in important countries in the world and production. Import and Export trade of cotton, yarn, and cloth in India. Classes and Prices of yarn and cloths produced in India. Handloom weaving industry in India. Fluctuations in prices of cotton. Futures and Hedging.

Group B—Practical Tests.

CLOTH ANALYSIS AND TESTING.

Comparative examination and testing of fabrics for weave, quality, materials used, balance of structure, shrinkage, twist, strength of threads, quantitative and qualitative analysis of mixed yarns and fabrics. Determination of grey particulars from dyed, bleached and finished fabrics.

PREPARATION AND SPINNING II.

Setting of various parts of spinning machinery. Working of machines.

PREPARATION AND WEAVING II.

Setting of various parts of weaving machinery. Working of machines.

GENERAL TEXTILE CHEMISTRY.

Scouring, bleaching, and dyeing of cotton. Mercerisation. Dyeing of wool and silk. Cloth printing. Identification of the class of a dyestuff. Testing the fastness of dyed materials. Working of machines.

TEXTILE DESIGNING.

Analysis of fabrics. Preparation of designs on graph paper suitable for weaving on Dobbies and Jacquards.

(d) Leather Technology.

(28) INTRODUCTORY LEATHER MANUFACTURE.

An elementary general course in Leather Manufacture dealing with the anatomy of hides soaking, liming, deliming, bating, etc ; the chief tanning processes both vegetable and chrome and the finishing of skins. The course includes the elementary study of tanning materials, chrome liquors, oils and fats, etc.

(29) CHEMISTRY OF LEATHER MANUFACTURE.

PART I.

Chemistry of curing of skins; Anatomical structure of skin; Ionisation of acids and bases commonly used in the tannery; Theory and determination of hydrogen ion activity (pH); Hydrolysis; General and physical chemistry of proteins, especially those occurring in hide; Donnan Equilibrium; Theory of swelling; Colloids ; Bacteriology of leather Manufacture.

(30) CHEMISTRY OF LEATHER MANUFACTURE.

PART II.

Technical water; Water softening; influence of constituents on tannery processes; Depilation; sweating ; Depilatories ; Chemistry of liming.

Natural and artificial bating materials ; Chemistry of peuring, bating and drenching.

Vegetable tanning materials with special reference to South Indian tanning materials; Chemistry of vegetable tannins.

Fermentation of Tan liquors ; Tannin extracts; Synthetic Tannins; Theory of Vegetable Tanning.

(31) CHEMISTRY OF LEATHER MANUFACTURE.

PART III.

Mineral tanning materials; Chemistry of chromium, Iron, and Aluminium; Chemistry of chrome liquors and of chrome tanning; Theories of Chrome tanning.

Other tannages.

Soaps, oils, fats and waxes; Theory of Emulsification and Emulsifiers. Chemistry of Dyestuffs and leather Dyeing.

Finishing materials, iucluding starches, Gums, Mucilages, Resins, Albumins, Pigments, Nitrocellulose and its solvents, etc.

Microscopy of Leather Manufacture; utilisation of bye-products—Glue manufacture.

(32) ORGANISATION AND ECONOMICS OF LEATHER MANUFACTURE.

Selection of site for tanneries.

Selection of machinery with special reference to the kind or kinds of leathers to be manufactured.

Layout of the tanneries, including the machinery.

Working of costs of manufacture of different classes of leathers.

(33) PROCESSES OF LEATHER MANUFACTURE.

PART I.

The preservation of raw hides and skins. Soaking; sweating, liming, and other methods of depilation. Unhairing, fleshing and rounding. Deliming, bating, puering and drenching.

The grinding and leaching of tanning materials and the manufacture of extracts. The vegetable tanning process in general and the South Indian Tannage and the manufacture of sole, belting, harness and dressing leathers in particular. Dressing of East India tanned Kips. Manufacture of Moroccos and other fancy leathers.

(34) PROCESSES OF LEATHER MANUFACTURE.

Part I.

Chrome one-bath and two-bath process, and the manufacture of box calf, glove kid, chrome sheep, etc.

Chrome sole and chrome leathers for technical purposes.

Alum tannages and the manufacture of glove and clothing leathers.

Oil tannages, Chamois. Buff leather. Fat leathers.

Tannages by means of formaldehyde. Quinone and synthetic tannins.

Combination tannages and the manufacture of variety of commercial leathers made by such combination processes.

Patent leather manufacture.

Leather dyeing and finishing.

Utilisation of bye-products and disposal of tannery waste.

(35) ANALYTICAL CHEMISTRY OF LEATHER MANUFACTURE.

The analytical investigation of waters; liming and deliming materials ; lime liquors ; tanning materials ; extracts ; tanyard liquors ; spent tanning materials; chrome liquors; gelatine; glue; soaps; oils, fats and waxes; sulphonated oils; mineral and vegetable tanned leathers; tannery effluents, etc.

Methods of determination of pH.

APPENDIX XXIV.

B. COM. DEGREE EXAMINATION.

SYLLABUSES AND TEXT-BOOKS.

PART I—ENGLISH.

1949.

Prose—Detailed:—

1. Arnold—Selections, Ed. Campagnac, (Macmillan).
2. Longer Specimens of Modern English Prose, (O.U.P.).

Non-Detailed:—

1. Trollope: The Last Chronicle of Barset.
2. Modern Short Stories—Scholar's Library, (Macmillan).
3. J. S. Hoyland: Gopal Krishna Gokhale, (Y.M.C.A. Publishing House, Calcutta).

1950.

Prose—Detailed:—

1. Carlyle—Selections from the French Revolution. Hemingway and Seymour, (D. C. Heath & Co.).
2. Longer Specimens of Modern English Prose *omitting* De Senectute, (O.U.P.).

Non-Detailed:—

1. Thackeray: Esmond.
2. M. R. Ridley: Abraham Lincoln, (Blackie & Son).
3. Tagore: Home and the World, (Macmillan).

1951.

Prose—Detailed:—

1. Carlyle—Selections as for 1950.
2. Jepson—More Modern Essays, (Longmans).

Non-Detailed:—

1. Hardy—Far from the Madding Crowd.
2. Sir Richard Livingstone—Some Tasks for Education, (O.U.P.).
3. Sardar K. M. Panikkar—A Survey of Indian History (The National Information and Publications, Ltd., Bombay).

PART II.

A Second Language.

Any one of the following languages:—

Modern	(1) *Foreign*	French	German
	(2) *Indian*	Tamil	Oriya
		Telugu	Hindi
		Kannada	Bengali
		Malayalam	Burmese
		Urdu	Sinhalese
		Marathi	

Note:—The language taken shall not be the same as that taken for the Intermediate Examination.

The course shall be (1) Translation from the selected language into English and *vice versa*, and (2) Composition which shall be in the nature of short letters dealing with Commercial Correspondence.

(*Note*:—No text-books will be prescribed).

PART III.

ECONOMICS.

Same as for B.A. Group (iv-a).

BANKING—THEORY AND PRACTICE.

(*a*) General principles, cheque system, Development of Deposit Banking, Clearing House, Banking Investment. Short loan Fund. Regulation of Note-Issue. Reserves and Discount Rates. Central Banking. Financial and Commercial Crises. Modern Development

(*b*) Organisation of Banking in India. The Imperial Bank, its constitution and relation with the Government and the other banks. The Exchange Banks and their place in the Indian Credit systems, Joint Stock Banks. Indigenous bankers, shroffs, Mahajans, etc., and their place in the Money Market. Recent conditions. The Reserve Bank and its functions.

(*c*) Comparison between the systems of Banking in India and the leading countries of the world.

(*d*) Law and Practice of Banking.—The legal relationship between banker and customer, Current accounts, Deposit accounts, Trust accounts, Loans, Overdrafts and Cash credits. The Pass Book. Secrecy of the state of Customer's account. Cheques and documents analogous to cheques. Payment and collection of cheques. Payment of cheques by mistake. Forged cheques. Securities for advances in general. Pledges and mortgages of negotiable instruments, stocks

and shares. Commercial credits. Realization of securities. Banker's guarantees. Miscellaneous securities, *viz.*, Lands and Buildings, Life Policies, Book Debts and Ship. Subsidiary service of Banks and the Law relating thereto.

(*e*) Foreign Exchange.—What is Foreign Exchange? Importance of Foreign Exchange in modern economic development. Mint Par of Exchange, Gold Points. Fluctuations in Exchanges, causes and effects thereof. Rates of exchange.—Long and short rates and Sight rates. Silver and Paper Exchange. The purchasing power. Parity Theory. Forward Exchange, Problem of stabilisation of Exchanges. Terminology of Exchange and how to read a Foreign exchange article. Indian Exchanges. Pre-war and Post-war. Present conditions.

Books recommended :

Todd : Mechanism of Exchange.

Sayers : Modern Banking.

B. Ramachandra Rao : Present-day Banking in India.

Muranjan : Modern Banking in India.

Sheldon : The Practice and Law of Banking.

Clare and Crump : Foreign Exchange.

H. T. Easton : Money, Exchange and Banking.

Sykes : Banking and Currency.

MERCANTILE LAW.

Introduction : Definition of terms. Statute and non-statute law. Civil and Criminal Law. Contracts—Definition, classification. Essentials—offer, acceptance, consideration, absence of mistake, misrepresentation or fraud, contractual capacity of the parties, legality and possibility, Rights and obligations. Contracts not enforceable. Assignment. Termination. Breach. Performance and discharge.

Agency: Nature. Class of Agents. Appointment. Termination, Rights, duties and liabilities. Relations with their parties. Types of agents—factors, brokers and other types.

Partnership: Definition, Creation, Essentials, relations of partners *inter se* and to third parties. Liability of partners. Dissolution. Goodwill. Limited Partnerships.

Companies: Formation. Kinds of companies. Memorandum and Articles of Association. Rights and liabilities of members. Shares and Debentures. Accounts and audit. Meetings and resolutions. Liquidation—compulsory, voluntary, supervision.

Sale of Goods: Definition, Price. Who may sell. Formalities of the contract. Acceptance and receipts. Rights and duties. Conditions and warrantees. Rights and remedies in case of breach. Lien and stoppage in transit. Transfer of property and instalment purchase.

Suretyship and Guarantee: Definition. Guarantee and indemnity. Rights and liabilities of surety, Discharge.

Negotiable Instruments: General characteristics, Bills of Exchange—form, stamps, Parties, acceptance, negotiation, endorsement, forgery, dishonour, noting and protesting, liabilities of parties, payment for honour, discharge, bills in asset, foreign bills, Cheques, Promissory notes, Bank notes, I.O.U.

Securities: Mortgages. Bills of sale, Pawn. Liens.

Insurance: Fire. Life. Marine. Motor Vehicles (third party).

Carriers and shipping: Common carriers. Duties. Liability at Common Law.

Rights of carrier. Affreightment. Charter party. Bill of lading.

Bankruptcy: Acts of bankruptcy. Petition. Receiving Order. Subsequent Proceedings. Discharge, Debtor's property and duties.

Books recommended:

S. R. Davar: Indian Mercantile Law.

Stevens: Mercantile Law.

Topham: Company Law.

Davar: A Manual of Indian Companies' Law and Practice.

E. Venkatesan, B.A., M.L.: Mercantile Law.

BUSINESS ORGANISATION AND COMMERCIAL GEOGRAPHY.

The nature, constitution and financing of individual entrepreneur organisation, partnership and Joint Stock Company and the Study of each of these forms of organisation from social and economic points of view. Chambers of Commerce and Trade Unions.

Promotion of Joint Stock Companies.—The nature and importance of Memorandum of Association; Articles of Association; Prospectus; Director's Report, Procedure and Conduct of Meetings of Directors and Shareholders, Managing agents, Management and administration.

Combination of business organisations.—Trade and industry combination; federation, consolidation, partial and complete. The organisation of Kartels and Trusts and their effects on labour, producer, consumer, the selling price and the internal organisation of the business units in the Trust organisation. Organisation of retail houses; wholesale concerns, departmental stores and multiple or chain stores. Co-operative distributive organization, Import and Export Trade.

The Factory System.—The modern machine system and the effect of its introduction upon labour, production and the organisation of industry. The factory system and the cottage industry. Scientific organisation and management of modern factories. Different forms of wage system, advertising.

Books recommended:

Haney: Business Organisation.

Davar: Business Organisation.

Taylor: Shop Management.

Taylor: Principles of Scientific Management.

Kimbal: Industrial Organisation.

Dutton: Business Organisation.

COMMERCIAL GEOGRAPHY.

Physical features and climate determine vegetable and animal life, which, with the distribution of minerals and natural wealth determine the settlement and economic life of mankind.

Temperature, rainfall and soils as factors affecting crops, animal life and the activities of mankind.

The principal natural region and their characteristics.

Study of principal commodities of commerce, their source, preparation for the market, and the conditions which determine their availability.

(i) Cereals—Wheat, barley, rye, oats, rice. The Principal sources and conditions affecting growth.

(ii) Other food-yielding and allied plants—Tea, coffe, cocoa, spices, sugar, tobacco and the principal fruits. The principal sources and conditions affecting growth.

(iii) Raw Materials of Industry—Cotton, rubber, silk, flax, jute, timbers. The principal sources and conditions affecting growth.

(iv) Livestock and their Products. (*e.g.* Furs and Hides)—Cattle, sheep and pigs, principal sources of supply and conditions affecting supply.

(v) Distribution of minerals and other natural exhaustible resources—Coal, iron, and other principal metals, oils, principal sources of supply and conditions affecting supply.

Commerce and its dependence upon differences in geographical conditions.

Transport and communications.

Location of Industries and reasons therefor.

Commercial Towns and Industrial Districts and the geographical causes of their location and importance.

Books recommended :

L. Dudley Stamp : A Commercial Geography.

Mukerjee : An Economic and Commercial Geography of India.

W. & A. K. Johnston : Commercial and Economic Atlas of the World.

Chisholm : Handbook of Commercial Geography.

L. Dudley Stamp : An Intermediate Commercial Geography, Vols. I and II.

Cotton : Handbook of Commercial Information.

ACCOUNTANCY.

1. Fundamentals of Double Entry Book-keeping and preparation of Final accounts.
2. Bills of Exchange—Consignments—Joint Venture.
3. Single Entry—Conversion of single Entry into Double Entry.
4. Self Balancing Ledgers.
5. Depreciation and Reserves—Reserve and Sinking Funds. (Advanced).

6. Partnership—Admission—Retirement and death of partner—Dissolution of partnership—Insolvency of partners—Amalgamation of partnerships—Conversion into limited companies.

7. Formation of Companies—Statistical records—issue of Shares debentures, etc.—Forfeiture—Amalgamations—Absorption—Reconstruction and reduction and Liquidation.

8. Double Accounts—Capital and Revenue, accounts of Non-trading concerns.

9. Departmental and Branch Accounts.

10. Hire purchase and instalment Agreement—Royalties.

Books recommended :

Carter : Advanced Accounts.

Batliboi : Advanced Accounts.

Spicer and Pegler : Book-keeping and Accounts.

Cropper, L. C. : Higher Book-keeping and Accounts.

William Pickles : Accountancy.

AUDITING

1. Audit and its objects—Conduct of an Audit—First and subsequent audits—Internal check.

2. Vouching of Cash Transactions.

3. Vouching of Journals and Subsidiary Books.

4. Vouching of Personal and Impersonal Ledgers.

5. Verification and Valuation of Assets and Liabilities.

6. Form of Accounts and Balance Sheet—Criticism of Balance Sheet.

7. Company Audit—Divisible Profits and Dividends.

8. Qualification of an auditor—His duties, rights and liabilities under Indian Companies Act.

9. Investigations.

10. Audit Reports.

Books recommended:

Spicer and Pegler: Practical Auditing.

Dicksee: Auditing.

Lancaster: Auditing.

Batliboi: Lectures on Auditing.

De-Paula: Principles of Auditing

Cutforth: Audits.

PRECIS-WRITING AND BUSINESS CORRESPONDENCE.

The writing of business letters, reports, descriptions and essays. The preparation of resumes of correspondence. Precis in the form of a narrative or story or of a document relating to a particular subject.

Books recommended:

Lydall: Precis-Writing.

Carrad: Commercial Correspondence.

Pocock: Precis-Writing.

Pink and Thomas: English Grammar, Composition and Commercial Correspondence.

OPTIONAL SUBJECTS.

(*a*) TRANSPORT.

1. *Railway Transport.*—(*a*) Capital and Expenditure. Combinations. Rates and Fares. Classification of goods and minerals. Discrimination and undue preference. State Regulations of rates and fares. State ownership and management.

(*b*) Divisional *versus* Departmental organisation. Passenger and Goods stations working. Rolling Stock Distribution. Marshalling Yards. Wagon pooling.

2. *Indian Railway.*—Development. Relation to the State Management. Railway Finance. Relation to one another. Internal administration and executive organisation. Changes suggested by the Acworth Committe.

3. *Road Transport.*—Economics of road construction and maintenance. Theories of rates and fares. Types of road transport. Relation to the State. Relation of road to railway transport. Roads and road transport as means of opening up undeveloped and outlying tracts.

4. *Sea Transport.*—Organisation of ocean transport services. Economics of marine transport. Rates and fares. Competition and monopoly. Rate and traffic agreements. Pools and Conferences. Shipping rings. The Deferred Rebate System and the Rate War. Government aid and regulation of Ocean Transportation, Ports, their functions and dues. Indian Mercantile Marine. The Indian Navy.

5. *Air Transport.*—Commercial possibilities of Air Transport. International Air Navigation. Commercial Organisation of Air Services. State *versus* Private Co-operation. Basic Principles of and Economic Factors in the operation of services. Present development of air transport in India.

Books recommended:

Acworth: Elements of Railway Economics.

K. G. Fenelon: Railway Economics.

S. C. William: Economics of Railway Transport.

Ripley: Rail-road—Finance and Organisation.

Sherrington: Economics of Rail Transport in Great Britain.

Srinivasan: Indian Railway Freight Rates.

Sanyal: Indian Railways.

Mehta: Indian Railway Rates and Regulations.

B. V. Narayanaswami (Edited): Road-Rail Transport.

Stephenson: Communications.

Haji: Economics of Shipping.

Ripley: Rail-road Problem.

(*b*) INSURANCE.

Insurance.—Life, Fire, Marine, Accident, Fidelity Guarantee. Motor Vehicles (Third Party), Employers' Liability—Insurable interest—Good faith—Disclosure—Representation—Warranty—Moral hazard.

Life.—Various types of Insurance—Whole life—Endowment—Annuity Group life, pension and other Schemes—The various forms of policy and the drafting thereof, mortality and elements of valuation, general nature, characteristics and uses of mortality tables including an elementary knowledge of the methods of compilation—General principles adopted in valuations—Valuation Schedules—Prospective and retrospective methods—Sources of Surplus of

profits—Methods of distribution of profits—Nominal and effective rate of interest—Expense ratio—Surrender value—Paid up Policies —Automatic Non-forfeiture Loan—Loans repayable by instalments.

Marine.—Underwriting by Lloyds—Policies (F.G.A., F.C.S., R.D.C. clauses). Salvage, General averages; Free of capture and seizure—Running Down clause—Lost or not lost clause—Various clauses—Perils insured against—claims Causa Proxima.

Total Loss —Actual and constructive—claims—Particular average and General average — Subrogation — reinsurance — and continued insurance—Salvage award.

Fire.—Proposals—classes of policies—reinsurance—claims payable—Average policy—Properties not covered—More than one policy.

Accident.—Its variety—Employer's liability insurance—Loss of earning capacity and Premium—Compensation for diseased.

Fidelity Guarantee.—General Principles—risk covered.

Motor Vehicles (*Third Party*).—General principles—reinsurance—Assessment of claims.

General.—Law relating to insurance contracts—Parties to contract —Insurable interests—Assignments, Mortgages, liens, settlements, claims, surrenders, title—Principal agents and third parties.

Books recommended:

R. C. Underwood: The Students' Book of Life Assurance.

J. B. Welson and F. H. Sheriff: Insurance Office Organisation and Routine.

T. D. Dutt: Law relating to Life Assurance in India.

J. F. Reed: Insurance.

H. H. Taylor and V. W. Taylor: Life Assurance.

H. H. Taylor and V. W. Taylor: Life Insurance from Proposal to Policy.

Goodwin: Principles and Practice of Fire Insurance.

Indian Insurance Act IV of '38.

Dr. R. M. Ray: Life Insurance in India.

(*c*) Co-operation.

Co-operation as a principle. Its application to modern business life. Its genesis and development in Europe and the Far East. Its working in America. This part is to cover all the European countries

about which literature is available, such as, Germany, Italy, Russia, France, Denmark and England. Also Japan, China and America.

Co-operation in India. Its evolution and history. Co-operation Law in the various Provinces. Various forms of Co-operative activity—their constitution and working principles.

Various forms of Co-operative activity. Degree of success achieved in the various Provinces.

Organisation for propaganda and control. Co-operative Finance and Accounting. Co-ordinating and higher agencies in the Co-operative Movement. Criticism of the existing things, and lines of further developments.

Books recommended:

Wolff : People's Banks.

Fay, C. R.: Co-operation at Home and Abroad.

Calvert, H.: Law and Principles of Co-operation in India.

Hough, F. M.: The Co-operative Movement in India.

Kaji, H. L.: Co-operation in India.

Bhatnagar, B. G.: Co-operative organisation in British India.

Kiyeshi, Ogata: The Co-operative Movement in Japan.

Mukerji, P.: Co-operative Movement in India.

Hemingway, R.: Madras Co-operative Manual.

Madras Co-operative Committee Report, 1940.

(*d*) Statistical Methods and their Application to Commerce.

Meaning and scope of statistics—Various definition of statistics—Law of Statistical Regularity and Inertia of Large numbers.

Statistical Investigation—General methods—Collection of primary and secondary data.

Tabulation—Single, double and manifold.

Classification of data.

Frequency Distributions.

Accuracy and Approximation.

Average—Arithmetic, Geometric and Harmonic. The mode and the median—Weighted averages—Characteristics of the different averages.

Methods of Presentation—Diagrams—Cartograms and Pictograms—Maps—Graphical representation—Simple Logarithmic and semi-Logarithmic graphs.

Dispersion—Meaning and Importance—Various measures of Dispersion and relation between them.

Skewness—Meaning and various measures of skewness.

Serial Statistics—Time series—seasonal, cyclical and Random fluctuations and methods of eliminating their influence—Secular trend.

Correlation (Linear only)—Meaning and measurement of correlation (with respect to ungrouped data only).

Interpolation—Meaning and Importance of Interpolation—Interpolation by graphic method only.

Index Numbers—Meaning and Importance of Index numbers—Various types of and construction of some important index numbers, as simple and weighted Arithmetic, Geometric and Aggregative. The two reversal test—Fisher's Ideal Index—Cost of Living Index—Index number of wholesale prices.

Government Published Statistics—The nature of the Statistics, publications of the various Provincial Governments and of the Government of India. Crop forecast and their commercial importance.

Study of the Indian Census.

Vital Statistics—Birth rate, Death rate—Crude, corrected and standardised.

Methods of Economic Survey—Preparation of schedules and questionnaires.

Books recommended:

Boddington: Statistics and their Application to Commerce.

Connor: Statistics.

Mills: Statistical Method.

P. J. Thomas and N. Sundararama Sastry: Indian Agricultural Statistics.

APPENDIX XXV.

B. COM. (HONOURS) DEGREE EXAMINATION.

SYLLABUS.

PART I.

There shall be two written papers of three hours' duration carrying a maximum of 100 marks each.

1. English Composition.

The course shall include the study of certain books prescribed for perusal. The books prescribed for perusal may include works of Fiction, Literary Criticism, Biography, History, Science or Philosophy.

Text-books:

1949.

1. Trollope: The Last Chronicle of Barset.
2. Modern Short Stories—Scholar's Library, (Macmillan).
3. J. S. Hoyland: Gopal Krishna Gokhale, (Y.M.C.A. Publishing House, Calcutta).

1950.

1. Thackeray: Esmond.
2. M.R. Ridley: Abraham Lincoln, (Blackie & Son).
3. Tagore: Home and the World, (Macmillan).

1951.

1. Hardy: Far from the Madding Crowd.
2. Sir Richard Livingstone: Some Tasks for Education, (O.U.P.)
3. Sardar K. M. Panikkar: A Survey of Indian History, (The National Information and Publications, Ltd., Bombay).

2. Precis-Writing and Business Correspondence.

The same syllabus as is prescribed for the B. Com. (Pass) Course, but a more detailed study is expected.

The following is the outline syllabus prescribed for the B.Com. (Pass) Course.

The writing of business letters, reports, descriptions and essays. The preparation of resumes of correspondence. Precis in the form

of narrative of a story or of a document relating to a particular subject.

(i) *Text-books*:

1. Stephenson's Principles and Practice of Commercial Correspondence.

2. Palser's Precis-writing.

(ii) *Books for reference*:

1. Earnshaw: Student's Manual of Precis-writing.

2. Henderson and Jones: A guide to correspondence for Bankers and Businessmen.

3. Nixon and Richardson: Secretarial Work and Practice.

4. Morrison: Precis-writing Vols. I, II and III.

PART II.

Practical Training.

The candidates should undergo practical training on Saturdays during the eight terms and in addition for a period of three months either at the end of the second year or at the beginning of the third year. The Deputy Registrar of Co-operative Societies (lecturer) will arrange the Saturday visits to the institutions with Co-operative Societies and Joint Stock Companies in the neighbourhood. He will also give practical training in official Co-operative Societies in administrative charge of the locality.

GENERAL ECONOMICS.

Introductory:—Nature and scope of Economics, Economics as a Social Science. Economic Laws, Methods of Economic Science. Definition of the principal terms of Economics.

Consumption:—Wants of man, their nature and classification. Diminishing utility and elasticity of wants. Consumers' surplus. Standard of Life. Family Budgets.

Economic Organisation:—The general structure and evolution of Modern Industry and trade. Bases of modern Economic life. Private property, freedom of contract; competition and monopoly.

Production:—Nature of and agents of production. Their changing importance. Land and other natural agents, Labour and causes affecting its efficiency. The quantity and quality of population. Division of Labour and the use of machinery. Capital—its nature and function. Enterprise. Risk-bearing, speculation and insurance.

Laws of production:—Increasing, diminishing and constant cost. Law of substitution. Large scale production. Localisation of industry. Types of productive organisation: partnership, joint-stock companies, Co-operative organisation. State Enterprise, Industrial combination. Rationalisation.

Value of Exchange:—Evolution of the market value, its meaning. Theories of value. Analysis of Supply and Demand. Cost of production. Joint supply and joint demand. Equilibrium of demand and supply. Value during short and long periods. Value and Price. Prices under free competition. Theory of Monopoly prices. Speculation and prices.

Mechanism of Exchange:—Money, Evolution and functions of money, Qualities of good money. The Quantity Theory of Money. Systems of Money: The gold standard and its variants. Bimetallism. Gresham's Law. History of Indian currency. Credit, instruments and prices. Paper money. Convertibility and inconvertibility. Indian paper currency. Banking: Functions of banks. Types of banks. Central banks. Variations in the value of money and their effects.

Internal Trade:—The basic of international exchange. Free trade and protection. Tariffs and bounties. Balance of trade. Foreign Exchanges. The Rupee exchange.

Distribution:—General theory. The nature and theory of rent, interest, profits and wages and the causes of their variation. The national income and its distribution; inequality of incomes, socialism, trade unionism.

Public Finance:—The Economic functions of the state. Public expenditure and sources of public revenue. General principles of taxation; direct and indirect taxes. Public debts.

Books recommended:

Marshall: Economics of Industry.

Clay: Economics for the General Reader.

Richards : Groundwork of Economics.

Jathar and Beri: Introduction to Economics.

Birnie : Economics in outline.

Books for Reference:

Briggs and Jordon: Text-Book of Economics.

Eric Roll : Elements of Economic Theory.

RURAL ECONOMICS.

I. Introduction.

Definition—science which deals with the business aspect of rural life—scope and method of study—differences between rural and urban conditions—difficulties in applying general principles of industrial economics to agricultural and farm life.

Evolution of agriculture—man as hunter—man as herdsman—the superiority of agricultural over pastoral life—agriculture and family life—agriculture and private property—agriculture and social organisation—communal subsistence—agriculture—individual subsistence agriculture—individual commercial agriculture—capitalistic commercial agriculture—collectivised agriculture—co-operative farming.

Importance of agriculture—agricultural *versus* industrial economics agriculture, on industry of small units—lack of specialisation in farming—conditions of production more inelastic—comparative ineffectiveness of competition—lack of combination—economic lag in agricultural production—peculiar nature of financial requirements.

History of Indian agriculture—transition from subsistence to commercial farming—its causes and effects—increasing dependence of Indian agriculture—on world conditions—increasing instability of agricultural unions—need for organisation.

II. Factors of Agricultural Production.

Land.—Definition of production—what is meant by land in production—agricultural wealth of India—land and its products— flora and fauna—the physical features of the land—climate—the monsoon geological composition—classification of soils—soil and crop—fertility—conservation of soil resources—soil erosion and its prevention—utilisation of land crop—land pasture—forest productivity per acre—law of diminishing returns—crop pests and their control—mixed farming and rotation of crops—dry farming—irrigation—the major irrigation works in India—Government policy—major and minor irrigation works—irrigation problems—possibilities of extending the area of arable land—land reclamation—land colonisation—intensive and extensive cultivation.

Labour.—What is meant by labour in production—peculiarities of agricultural labour—farm labour in India—population and its relation to Indian agriculture—low yield per worker—its causes and remedies. The problem of the landless labourers. Need for supplementing the income of the farm worker—subsidiary and cottage

industries—handloom weaving—its present position—the problems of the weaver—how to organise the weavers with reference to their needs in production, finance and marketing—dairy industry. Its present position and possibilities—co-operative dairying—other rural industries.

Capital.—What is capital—productivity of capital—manure—manurial needs of the soil—the ingredients of plant food—cattle manure—composts—green manure—leguminous plants—chemical fertilisers—organised supply of manure—co-operative purchase and distribution of manure—implements—use of improved implements—possibilities of mechanizing agricultural industry—use of power—Hydro-electric power—seed—use of improved seed—need for organised distribution of better seed—co-operative schemes.

Live Stock—The cattle wealth of India—problems of proper feeding and better breeding—the importance of cattle rearing—cattle diseases and their control—the evolution of dual purpose breed for milching and draught—cattle insurance—cattle breedings—co-operative societies—cattle rearing as an industry—need for collaboration between the agricultural, co-operative and veterinary departments.

The problems of agricultural finance—its peculiarities—short, medium and long term finance—need for specialised agencies, individual, institutional and state help—money-lenders and indigenous bankers—Joint Stock Banks—Co-operative societies and land mortgage banks—Government loans—Reserve Bank and agricultural credits—rural indebtedness—its causes, extent and remedies.

Organisation.—Need for setting agriculture on an organised footing. Fragmentation and sub-division of holdings. Their causes, extent, and remedy—consolidation—by compulsion—legislative enactments for consolidation—voluntary consolidation—co-operative societies for consolidation of holdings—their scope in the province.

Several land systems—land tenures in India—Zamindari—ryotwari and Mhalwari tenures—peasant proprietorship and tenancy holding—large scale and small scale farming—joint farming—farm equipment—scientific management.

Marketing and Transport.—Problems of buying and selling—marketing a problem in production—creation of farm, space and time utilities—assembly, processing, grading, transporting, storing and financing and distribution and sale of agricultural commodities—the

present marketing methods—fairs—middlemen—private merchandizing—disadvantages—orderly marketing—co-operative marketing societies—the extent of their progress and activities in the province—superiority of the co-operative method—transport facilities—road, rail and river transport—freight rates—weights and measures—market survey and market intelligence.

III. State and Agriculture.

Research—demonstration — propaganda — development departments—their evolution and policy—organisation of agricultural research—economic councils and marketing boards—the state and agricultural prices—state and land policy—land revenue administration and land settlement.

IV. Rural Social Problems.

Rural social needs—the village—the village administration—village panchayats—their history and present function—reconstruction of rural life—experiments in rural reconstruction—how to increase the standard of life of the villager—rural sanitation and rural hygiene—education of the farm youth—peasant leagues and rural clubs—rural welfare centres—co-operation and rural welfare.

A short course of lectures on "Rural Health and Sanitation" by an Officer of the Public Health Department, on "Panchayats and Villages Administration" by an Officer of the Local Self-Government Department, on "Land Revenue Administration and Land Settlement" by a Revenue Official, on "Agriculture and Livestock" by a Veterinary Officer, and on "Land Improvement" by an Officer of the Agricultural Department may also be arranged in consultation with the Departments concerned.

Books for study:

1. Principles of Rural Economics by Carver.
2. Rural Economy of India by R. Mukerjee.
3. Indian Agriculture by Howard.
4. A Primer of Agricultural Economics by Sir Henry Reid.
5. Agricultural Progress in Western India by Keatings.
6. The Panjab peasant in prosperity and debt by M. L. Darling.
7. The wealth and welfare of the Panjab by Calvert.
8. Land Tenure in British India by Baden Powell.
9. The Agricultural Commission Report.
10. Rural Economics of Indian Agriculture by Dr. B. V. N. Naidu.

(a) HISTORY AND PRINCIPLES OF CO-OPERATION.

1. *Introductory*:

Co-operation—definition—difficulty of definition due to historical, legal and social causes—conscious and unconscious—Co-operative Principles—association for satisfying a common economic need—voluntary association—principle of equality and democratic management—equitable distribution of benefits—charitable organisations—capitalistic and Joint Stock concerns and communistic state-owned enterprises—a golden mean—different forms of co-operation—its need and basis—consumer's co-operation—Producer's co-operation—co-operative marketing — co-operative banking — better living societies—combination of co-operative societies—vertical and horizontal.

2. *Origin*:

Industrial revolution—some results of industrial revolution—Robert Owen and the early co-operative movement—the equitable pioneers of Rochdale—the Christian socialists—wholesale co-operators—brief history of the British Co-operative movement—Producers' Co-operation in England—self-governing workshops—origin and development of co-operation in Germany—" Village Banks "—of Raiffeisen—" Credit Associations " of Schulze Delitzech—co-operation in Italy—" Baube Popolari" of Luzati—" Clause Rurali " of Wollemborg—catholic or communal Banks—State control—Co-operation in other European countries like Russia, France, Denmark and Ireland, Co-operation in America, Japan and China.

3. *History of Co-operation of India*:

History of co-operation in India—the geographic background—area, topography and soil, climate, etc.—the social background—population—structure of the Indian society—customs and manners—the caste system—the joint family—the economic background—occupational distribution of population—main industries—per capita income—agriculture in India—one industry concentration—antiquated methods of cultivation—systems of land-holding—inadequate finance—the growth and volume of agricultural indebtedness in India—causes and results of the indebtedness—indebtedness and usury—the

starting of the Nidhis—remedial measures attempted by the state—Nicholson's Report 1895—97—"people's bank" of Deupernex—Co-operative Credit Societies Act of 1904—Co-operative Societies Act of 1912—the Maclagan Committee, 1914–15—Government of India Act of 1919—Provincial Acts—the Townsend Committee in Madras, 1927–28—the Madras Co-operative Societies Act of 1932—The Madras Co-operative Land Mortgage Banks Act of 1934—the Malabar Co-operative Land Mortgage Bank Enquiry Committee—recent debt legislation—Madras Committee on co-operation 1939–40 —the Ceded Districts Co-operative Committee, 1945—The All-India Co-operative Planning Committee 1946.

4. *Principles of Co-operative Institutions*:

Area of operations—membership—A class, B class—Selection of members—rights and responsibilities—democratic management and control—general body—sovereign assembly—powers and responsibilities—executive committee—office bearers—President, Vice-President, Secretary, Assistant Secretary, Treasurer—Election of office bearers and delegates—remunerations—raising of funds—share capital deposits—cash credits and overdrafts—borrowings—investments of funds—utilisation of funds—loans utilisation in the business of the society —net profits—Reserve fund—Dividend and remuneration to share capital—common good fund—other funds.

5. *Consumers' Co-operation* :

A. Co-operative Stores; objects—principles of the store movement—Division of profits—dividend on purchases—federation of Primaries into wholesale stores—relation between the primaries and the wholesales—history of the co-operative stores in Madras—causes for the slow growth—recent expansion—T.U.C.S.—rural and urban stores—post-war existence—school and college stores.

B. Co-operative House Building Societies—Housing problem in urban areas—need for cheap long-term capital—main types of house building societies—individual ownership system and co-partnership system—principles to be observed in the organisation of building societies—methods of their working in Madras—grant of state loans—rules—dismortgaging insurance.

C. Co-operative insurance: the theory of insurance—main features—co-operative insurance—history of co-operative insurance in Madras.

D. Other Societies—Co-operative Printing Presses—forest Coupe—Charcoal Producer's Societies—Co-operative restaurants.

6. *Producers' Co-operation*:

(*a*) Weaver's Societies—difficulties in organisation and working of the Madras Handloom Weavers' Provincial Co-operative Society.

(*b*) Milk Supply societies—organisation—methods of working—federation into unions—difficulties to be overcome.

(*c*) Industrial and credit societies; co-operative sugar factories—cottage industries societies—women's societies—co-operative district workshop—provincial federation.

(*d*) Other societies.

7. *Co-operative Marketing*:

The existing methods of marketing agricultural produce and their defects—functions of marketing—collection and assembly—storage and distribution—organisation of sale societies—sales on consignment and commission basis—principle of outright purchase—finance—grant of loans on the pledge of produce and the safeguards to be adopted—"open" "key" cash credits—godown facilities—market intelligence—study of markets and preparation of marketing surveys—federation of marketing societies—regional and commodity organisation—marketing societies in other parts of India—cotton sale societies of Bombay—cane growers' societies of United Provinces.

8. *Co-operative Banking*:

(*a*) Introductory: The conditions of sound credit—proximity, security, facility—the need for credit among the agriculturists and working population—village sowcars and urban money-lenders—rates of interest—chronic character of borrowing—organisation and technique of money lending—the economic function of money lender—sowcar's credit—state credit; Takkavi loans—co-operative credit: short, intermediate or medium and long term credit.

(*b*) Rural credit society: Resemblance to Raiffeisen societies—unlimited liability—advantages and disadvantages—safeguards against special types of credit societies for weavers, field labourers, criminal tribes, hill tribes, etc.

(*c*) Urban Banks: Schulze model—difference between rural and urban societies—fluid resources—types of Urban Banks—people's Banks, Employee Societies, societies for petty wage earners, Scavengers, menials, etc.

(*d*) Supervision: Need for supervision, separation from finance—organisations for supervision—supervising unions—guaranteeing unions—Banking unions—federation of unions—causes of decay—administrative section in Central Banks.

(*e*) Short and medium term finance: Co-operative Central Banks—need for Central Banks—history of the Central Banks in Madras—constitution and management—society and individual members—importance and method of maintaining fluid resources—need for an apex bank—Madras Provincial Co-operative Bank—history—constitution and management—relation with Central Banks—its role in and responsibility for the spread of the Co-operative movement in the Province—its relation with Joint Stock Banks and the money market.

(*f*) Long term finance: Underlying principles—Primary land mortage banks—objects—working state aid—formation of Central Land Mortgage Bank—its functions—constitution and working debentures—issue and redemption—sinking fund—government supervision.

9. *Co-operative Better Living Societies*:

Agricultural Demonstration Societies—Health of Anti-Malarial Societies — Irrigation Societies—Land Reclamation Societies Land colonisatien Societies—consolidation of holdings Societies.

10. *Co-operative Education and Propaganda*:

Importance of co-operative education and propaganda—language federations—Madras Provincial co-operative union—co-operative journal—conferences—co-operative institutes—panchayat training classes—college of co-operation—need for a research section.

11. *State and Co-operation*:

Growth and organisation of the movement—organisation of a society—registration—starting—Registrar—statutory functions—inspection, supersession, liquidation, arbitration, execution—state aid.

12. *Achievements of Indian Co-operation*:

Handicaps and the weakness of the movement in India—complexity of the problem—widespread illiteracy—lack of business enterprise—lack of spontaniety—delayed and inadequate finance—concentration on credit aspect—overdue loan situation—achievements: effect upon money-lenders—encouragement of thrift—training in democracy—effect on members' morals—war-time service—post-war role—aims and ideals—co-operative commonwealth.

Books recommended:

1. Hall and Walkings: A Survey of the History, Principles and Organisation of the Co-operative Movement in Great Britain and Ireland.
2. Beatrice Porter: Co-operative Movement in Great Britain.
3. J. B. Warhasse: Co-operative Democracy.
4. N. Baran: Co-operative Banking.
5. Eleanor M. Hough: The Co-operative Movement in India.
6. The Madras Co-operative Manual, Volume I.
7. The Madras Land Mortgage Banks' Manual.

Books for reference:

1. Nicholson's Reports, Volumes I and II.
2. Report of the Famine Commission, 1901.
3. The Maclagan Committee Report.
4. The Townsend Committee Report.
5. The Vijayaraghavachari Committee Report.
6. The Madras Co-operative Manual, Volume II.
7. Report of the Royal Commission of Agriculture in India (Chapters relating to co-operation).
8. The Central Banking Enquiry Committee Report (Chapters relating to co-operation).

9. Sydney and Beatrice Webb: Consumers' Co-operation.
10. M. L. Darling: The Punjab Peasant in Prosperity and in Debt.
11. Bulletins issued by the Agricultural Credit section of the Reserve Bank of India.
12. V. Anstey: The Economic Development of India.
13. C. R. Fay: Co-operation at Home and Abroad.
14. Wolff: People's Banks.
15. B. V. Narayanaswamy: Agricultural Debt Relief Act—a study.
16. Bhatnagar, B. G.: Co-operative Organisation in British India.
17. Kiyeshi Ogata: The Co-operative movement in Japan.
18. Mukerji, P.: Co-operative movement in India.
19. The All-India Co-operative Planning Committee Reports, 1946.

(*b*) CO-OPERATIVE LAWS.

The Co-operative Credit Societies Act of 1904.

The Co-operative Societies Act of 1912.

The Madras Co-operative Societies Act of 1932 and the rules framed thereunder.

The Madras Co-operative Land Mortgage Banks Act of 1934 and the rules framed thereunder.

The Insurance Law in so far as it affects Co-operative Insurance Societies.

The Multi unit Co-operative Societies Act.

Registrar's circulars and model by-laws.

Books for Study:

1. Calvert: Law and Principles of Co-operation in India.
2. Viyanna: The Madras Co-operative Societies Act VI of 1932.
3. Austin: The Madras Co-operative Manual.

The Madras Co-operative Land Mortgage Banks' Manual.

The Circulars of the Co-operative Department.

MERCANTILE LAW.

Introduction :—Definition of terms. Statute and non-statute law. Civil and Criminal Law. Contracts—Definition, classification.

Essentials—offer, acceptance, consideration, absence of mistake, misrepresentation or fraud, contractual capacity of the parties, legality and possibility. Rights and obligations, Contracts not enforceable. Assignment. Termination. Breach, Performance and discharge.

Agency :—Nature, Class of agents, Appointment, Termination, Rights, duties and liabilities. Relations with their parties. Types of agents—factors, brokers and other types.

Partnership :—Definition, creation. Essentials, relations of partners. *Inter se* and to third parties. Liability of partners. Dissolution. Goodwill. Limited partnerships.

Companies:—Formation. Kinds of companies. Memorandum and Articles of Association. Rights and liabilities of members, shares and Debentures. Accounts and audit. Meetings and resolution. Liquidation—compulsory, voluntary supervision.

Sale of Goods :—Definition. Price. Who may sell. Formalities of the contract. Acceptance and receipt. Rights and duties. Conditions and warranties. Rights and remedies in case of breach. Lien and stoppage in transfer of property and instalment purchase.

Suretyship and Guarantee :—Definition. Guarantee and indemnity, Rights and liabilities of surety. Discharge.

Negotiable Instruments:—General characteristics. Bills of Exchange—forms, stamps, parties, acceptance, negotiation, endorsement, forgery, dishonour, noting and protesting, liabilities of parties, payment for honour, discharge, bills in a set, foreign bills, Cheques, Promissory notes, Bank notes, I.O.U.

Securities : Mortgages. Bills of sale, Pawn. Liens.

Insurance : Fire, Life, Marine, Motor Vehicles (third party).

Carrier and shipping ; Common carriers. Duties. Liability at Common Law.

Rights of carrier : Affreightment. Charter party. Bills of lading.

Bankruptcy : Act of Bankruptcy, Petition. Receiving Order, Subsequent Proceedings, Discharge, Debtor's property and duties, rights and duties of liquidators, trustees and receivers. Law of Arbitration and award. Trade disputes and Employer's Liability.

Books recommended:

S. R. Davar : Indian Mercantile Law.

Stevens : Mercantile Law.

Topham : Company Law.

Davar : A Manual of Indian Companies' Law and Practice.

Pollock and Mullah : Indian Contract Act.

K. J. Rustomji : Indian Companies Act.

T. S. Kherghamwala : Indian Companies Act.

Reference :

K. Venkoba Rao : Indian Companies Act.

BANKING.

Theory and Practice:

(*a*) General principles, cheque system, Development of Deposit. Banking, Clearing Houses, Banking Investments. Short Loan Fund. Regulation of Note issue. Reserves and Discount Rates. Central Banking. Financial and Commercial Crises. Modern Development.

(*b*) Organisation of Banking in India. The Imperial Bank, its constitution and relations with the Government and the other banks. The exchange Banks and their place in the Indian credit systems. Joint Stock Banks. Indigenous bankers, shroffs, Mahajans, etc., and their place in the Money Market. Recent conditions. The Reserve Bank and its functions.

(*c*) Comparison between the systems of Banking in India and the leading countries of the world.

(*d*) Law and Practice of Banking :—The legal relationship between banker and customer. Current accounts, deposit accounts. Trust accounts, Loans, Overdrafts and cash credits. The Pass Book. Secrecy of the state of customer's account. Cheques and documents analogous to cheques. Payment and collection of cheques. Securities for advances in general. Pledges and mortgages of negotiable instruments, stocks and shares. Commercial credits. Realization of securities, *viz.*, Lands and Buildings, Life Policies, Book Debts and Ships. Subsidiary service of Banks and the Law relating thereto.

(*e*) Foreign Exchange:—What is Foreign Exchange? Importance of Foreign Exchange in modorn economic development. Mint Par of Exchange, Gold Points, Fluctuations in Exchanges, causes and effect thereof. Rates of exchange—Long and short rates and Sight rates. Silver and Paper Exchange. The purchasing power. Parity Theory. Forward exchange, Problem of stabilisation of Exchanges. Terminology of Exchange and how to read a Foreign Exchange article. Indian Exchanges, Pre-war and Post-war. Present conditions.

Outlines of Currency:

(*a*) The Functions and economic significance of money—various forms of money—metallic currencies and coinage—currency deterioration; its causes, measures and remedies—Legal tender—Paper money—Monetary standards—The purchasing power of money and quantity theory—Indian Currency Problems.

(*b*) Branch Banking.

(*c*) Outlines of the history and growth of Banking in England. The Bank of England and its relation to the Government—the Commercial and Banking World and the general public. Indian Banking, Money-lenders and indigenous bankers—Their importance in Rural Finance—The Joint stock banks—the Imperial Bank of India – The Exchange Banks—The Reserve Bank of India—Outlines of Co-operative Credit movement in India—Provincial and District Co-operative Banks, Unions and Credit Societies—Land Mortgage Banks.

(*d*) Bank of International settlement.

(*e*) International monetary fund of World Banks.

Books recommended:

Todd: Mechanism of Exchange.

Sayers: Modern Banking.

B. Ramachandra Rao: Present-day Banking in India.

Muranjan: Modern Banking in India.

Sheldon: The Practice and Law of Banking.

Clare and Crump: Foreign Exchange.

H. T. Easton: Money, Exchange and Banking.

Sykes: Banking and Currency.

ACCOUNTANCY.

Special Problems in Partnership Accounts.

Company Accounts, including Amalgamation, Absorption and Reconstruction.

Double Account system.

Bank Accounts.

Royalty Accounts. Hire-Purchase Agreement and Instalment System.

Departmental and Branch Accounts.

Depreciation, Reserve and Sinking Fund (Advanced).

The Accounts of different commercial undertaking and public Utility Companies, Life Assurance Accounts, Bank Accounts, Bankruptcy Accounts, Liquidation Accounts, Outlines of cost Accounts and outlines of Income-tax Accounts.

Books recommended:

Carter: Advanced Accounts.

Batliboi; Advanced Accounts.

Spicer and Pegler: Book-keeping and Accounts.

Sropper, L. C.: Higher Book-keeping and Accounts.

William Pickles: Accountancy.

AUDITING.

The Continuous and the Completed Audit; the Detection of Fraud, Technical Errors and the Errors of Principle. First and subsequent Audit; Verification of cash; Securities, Stock Sheets and Wages Sheets; Special considerations in different classes of audit; Valuation of fixed and floating assets; Form of accounts and balance sheets; Capital and Revenue items: Auditors' certificate; the liabilities of Auditors; the conduct of investigations and the certifying of average profits.

Books recommended:

Spicer and Peglar: Practical Auditing.

Dicksee: Auditing.

Lancaster: Auditing.

Batliboi: Lectures on Auditing.

De-Paula: Principles of Auditing.

Cutforth: Audits.

I. Nature and definition of audit—object of an audit—advantages of an audit—various kinds of audit—statutory audit—concurrent or continuous audit, completed or final audit—method of work in audit—qualities, rights, duties, and responsibilities of an auditor.

II. Audit of Co-operative Society; State-controlled audit—Registrar's responsibility—scope of Section 37 of the Madras Co-operative Societies Act VI of 1932—difference between audit of a co-operative society and the audit of a Joint Stock Company—various agencies employed by the Registrar for audit—Government staff audit Unions—Audit schemes—Registered accountants—Books to be maintained by co-operative societies—Rule V of the rules—Brief description of the books—Interim audit—final audit—Annual statement—Rule VII of the Rules. Audit Certificates issued by the Registrar—Points to be studied before commencing Audit—examination of by-laws—instruction of the Registrar—difference between inspection, supervision and audit.

III. Audit of credit societies (limited and unlimited).

A. Checking of the cash book:—Internal check—voucher defined.

(*a*) Vouching payments: Share Capital (invested) loans to members—refund of share capital—refund of deposits—repayment of loans—to Central banks—Establishment and contingent charges—supervision fund—court costs—remuneration for clerical work—dividends—Expenditure out of common good fund—investment of reserve fund—other investment deposits—debentures—Government promissory notes—Section 34 of the Act—purchase of immovable properties including buildings—other miscellaneous payments—missing vouchers.

(*b*) Vouching receipts:—Share capital—entrance fee—loans—from central Banks—deposits—repayment of loans by members—interest—principal—court costs—interest and dividend on investments—sale proceeds of investments and immovable property—other miscellaneous receipts.

(*c*) Verification of cash balance:—Cash on hand and in Bank—savings Deposit—Bank Pass book—reconciliation

statement—preparation of the statement of receipts and charges.

(*d*) Ledger postings:—General ledger—special ledgers—loans — shares — borrowings — investments—suspense—distinction between capital and revenue expenditure.

B. (*a*) Examination of other books:—

(1) Receipt Book. (2) Cash Book. (3) Loan ledger—overdue debts—verification of loans—time-barred debts—default by Panchayat—rule XVIII—application of. (4) Liability Register I. M. B. P. (5) Admission book—share instalments—heavy withdrawals—membership in two societies—Rule XX. (6) The borrowings ledger—overdues M. B. P. (7) Property statement register. (8) Minute Book—general and panchayat meetings—under execution. (9) Fluid resources—registers. (10) Pass resources—Registers. (11) Pass books of the members.

(*b*) Final closing of accounts:—

Ledger balances—verification of assets—loans and buildings—lands—investments—valuation of assets—security for loans—bad and doubtful loans—fall in value of investments—depreciation of other assets—verification of liabilities—share capital—loans and deposits—reserve fund—unclaimed dividend—undivided profit—Building fund—dividend equalisation fund—common good fund—supervision funds—other liabilities—statement of creditors and central banks—liability register—preparation and attestation by members.

C. Calculation of outstandings, assets and liabilities:—

(*a*) Assets: interest pending realisation—(1) accrued but not overdue, overdue, accrued after an item of interest has become overdue—Interest taken to book—profit—net profit. (2) Interest and dividend on investments due. (3) Expenditure paid in advance. (4) Deferred revenue expenditure. (5) Adjusting heads.

(*b*) Liabilities:—(1) Interest pending payment. (2) Supervision fund. (3) Audit fees. (4) Establishment and contingent charges—due. (5) Excess interest. (6) Adjusting heads.

D. *Profit and Loss Account.*

Profit:—(*a*) Interest earned. (*b*) Miscellaneous income.

Loss—(*a*) Interest paid and due. (*b*) Establishment and contingent charges—paid and due. (*c*) Miscellaneous items—net profit.

E. *Balance Sheet.*

Marshalling of various items—differences between assets and liabilities—reconciliation with difference between profit and loss.

F. Audit Certificate.

Summary of defects—Confidential report—Special reports relating to fraud.

IV. Audit of co-operative stores:—Internal check—daily sales book—classification sheets—trade deposits—purchase—incidental charges—goods ledger—stock-taking—verification of stock—trading account—verification of balance sheet.

Audit of Special Types of Societies.

Labour contract societies—Wages—Payments—Internal check.

Loan and sale societies:—Verification and valuation of stock—Godowns purchased out of Government loans.

Building societies:—Valuation of house sites and building—equated repayments—checking. Land Mortgage Banks—Valuation of mortgages.

BUSINESS ORGANISATION.

The nature, constitution and financing of individual entrepreneur organisation, partnership and joint stock company, and the study of each of these forms of organisation from social and economic points of view.

The nature and importance of Memorandum of Association; Articles of Association; Prospectus; Directors' Report. Meeting of Directors and Shareholders—Promotion of Joint Stock Companies and their control, Managing Agents.

Combinations of Business Organisations:—Trade and Industry combination; federation, partial and complete. The organisation of Kartels and Trusts and their effects on labour, producer, consumer, the selling price and the internal organisation of the business units in the Trust organisation.

Organisation of Retail houses; wholesale concerns, departmental stores and multiple shops.

The Factory System:—The Modern Machine system and the effect of its introduction upon labour, production and the organisation of industry. The factory system and the cottage industry. Scientific organisation and management of modern factories. Different forms of wage system. Advertising.

Books recommended:—

Honey: Business Organisation.

Davar: Business Organisation.

Taylor: Shop Management.

Taylor: Principles of Scientific Management.

Kimbal: Industrial Organisation.

Dutton: Business Organisation.

Salesmanship:—Salesmanship as applied to indent business in India. The science and art of business of selling. The essentials of good salesmanship and modern methods of selling, marketing to the dealer and to the consumer. Various methods of selling—Mail order, circular, form letter and follow up system—business correspondence, arithmetic, forms and documents, and special trade terms—orders, accounts, credits and collections, Law as affecting sales and salesman—general commercial knowledge—a knowledge of customer and goods—the checking and comparison of results.

Books recommended:—

Salesmanship and Advertising: H. W. Houghton.

Practical Salesmanship: Fowler.

Scientific Advertising:—Its advantages and drawbacks as complained of—examined. The successful advertiser—The copy attention value—suggestion value—memorising value—conviction value—value from point of view of sentiment—answering demands and creating habits—appeals to the human instinct or inclination—the mediums and their respective advertising values examined, *viz.*, letters and circulars, Newspapers and magazines, placards and others—media of outdoor publicity, prospectus and catalogues. Theatrical programme and shop-window advertising agencies, their scope of work and the services rendered by them to the business world.

Books for study:

Business Organisation: Davar.

Understanding Advertising: Hawley and Zabin.

Productive Advertising: H. W. Hess.

Secretarial Work:—

Organisation of Indian companies, managing agents, board of directors, their organisation, functions and duties, selections of the Board from the point of efficiency, Committees and their functions. Resolutions in connection with company practice. Drafting of reports of meetings of special committees, shareholders' meetings such as annual and statutory meetings.

The work of secretaries of limited liability companies and their staff, with particular reference to (1) Formation, issue of capital prospectus, underwriting, memorandum and Articles of Association, (2) Office organisation, Labour saving equipment, filing systems, (3) Correspondence, circulars to shareholders, reports, financial and statistical returns, (4) statutory books, returns, etc., to be filed with Registrar of Companies, (5) work of transfer departments and various forms, etc., used application for, and allotment of shares, stock, etc., transfer and transmission, calls, dividends, debentures, debenture stocks, share warrants, notice issue, (6) procedure at meetings and Directors and shareholders, kinds of meetings and resolutions, drafting of resolutions, notes, agenda, minutes, proxies, methods of voting, (7) general administration, methods of borrowing procedure upon reconstruction and capital, capital reorganisation, (8) Drafting of Committee and other reports.

Books recommended:

Business Organisation by Davar.

Manual of Secretarial Practice by Head and Fausset.

APPENDIX XXVI.

SYLLABUSES AND TEXT-BOOKS FOR THE DIPLOMA COURSES.

Diploma Course in Politics and Public Administration.

SYLLABUS IN PUBLIC ADMINISTRATION.

PRINCIPLES AND PRACTICE.

1. The scope and nature of Public Administration—its importance in the modern state—relations between Government and Administration—relations between the Administrative and Legislative and Judicial authorities—Legislative and Judicial powers of the Administration—in England, in India—Administrative Law—in England, in India.

2. The organization of Administration—in a Unitary State—in a Federal State—Central or Federal Government—Provincial Government—Centralization and Decentralization—Local Administration—Local Government (internal organization—Council and Committees)—Area—Council and Executive Officer—Control of Central over Local Administration and Local Government—in England and British India—Inspection.

3. Organization of Departments—Number—Chief Departments of Modern Administration—Central or Federal and Provincial—Defence (internal and external)—Finance (Accounts and Audit)—Revenue—Education—Public Works—Public Health—Development—Public Utilities. (Post Office—Electricity—Irrigation—Transport)—Relations between departments—Relations between departments and the public and outside bodies—Publicity.

4. Internal organization of a department—Collegial or individual heads—Government by Boards—Sections or Bureaus—Accounts—Records—Establishment—Investigation—Method of work.

5. Organization of personnel—The Civil Service—in England, in India—Recruitment—Training—Promotion—Discipline—Remuneration—Retirement—Civil or Public Service Commissions in England, Canada, Australia and India.

The scope is indicated by the following books:

L. D. White: Public Administration.

Ghose: Public Administration in India.

For Reference.—

N. Ghosh: Comparative Administrative Law.

SYLLABUS FOR THE HISTORY OF ADMINISTRATION IN INDIA AND MACHINERY OF GOVERNMENT.

I. Administration of India under the East India Company. Revenue, Police, Judicial, Army, Navy. Relation to Government in England. Relations with country powers under the Company, with Indian States under the Crown. Relation to Indian Princes. The Political Department. The Resident. Social and political theories which influenced administration.

II. Constitutional landmarks in outline: 1861, 1892, 1908-9, 1919, 1935. The India Office.

III. The Viceroy and Governor-General. The Executive Council—The Portfolio System—The Commander-in-Chief and his duties. The Secretariat: its organization, procedure and work. Committees of the Legislature.

IV. Administration of India under the Crown:

Centralization and decentralization. The financial policy of British India. The Budget—Famine Policy—Educational Policy. Railways and Railway Administration—Revenue Administration, the Army and Army Policy in India.

V. Public Services in India. Provincial and Subordinate Services—Public Service Commission.

VI. (*a*) Provincial Administration especially of the Madras Presidency—the Governor: his powers and functions—The Executive Council—Dyarchy—Provincial Autonomy—Cabinet Government. Board of Revenue. The Secretariat—Departments of Government—Secretaries and their duties—Office procedure.

(*b*) District Administration—The Collector and his subordinates—Judicial organization and administration. Organization of legislature. Local Self-Government—

District Boards—Madras Corporation—Mofussil Municipalities. Village and village administration—The Panchayat system.

Books recommended:

Keith, A. B.: Constitutional History of India.

Keith, A.B.: Speeches on Indian Policy.

Kaye: History of Administration of the East India Company (1853).

Ruthnaswamy, M.: Some Influences that made the British Administrative System in India.

Joshi, G. N.: Indian Administration.

Palande: Introduction to Indian Administration.

Roberts, P. E.: A History of British India.

Punnaiya : Constitutional History of India.

Rudra, K. E : The Viceroy and Governor-General of India.

Handbook of Administration of the Madras Presidency.

PUBLIC FINANCE.

Soltau : Economic Functions of the State.

Dalton : Public Finance.

Indian Taxation Committee Report.

Glaeser : Outlines of Public Utility Economics.

Wattal : Financial System of India.

INDIAN CONSTITUTIONAL LAW.

The Government of India Act, 1935, with Orders in Council, Rules and Regulations.

ACCOUNTS AND COST ACCOUNTING.

Batliboi : Advanced Accounts.

Crawford : Higher Book-keeping and Accounts.

Biggs, W. W.: Accounts.

Hawkins: Cost Accounts.

For Reference:

Wheldon : Cost Accounts and its Methods.

Diploma in Statistics.

SYLLABUS.

Scope.—The course is intended as an introduction to Statistica methods and their application to different branches of knowledge. In addition, intensive study of two subjects mentioned below is required :—

I. MATHEMATICS.

Algebra:

Permutation and combination—logarithms—progressions—the binomial theorem and simple problems involving its use—solution of equations—Horner's method.

Trigonometry:

Trigonometric ratios—addition formulae—circular measure.

Co-ordinate Geometry:

Functions—loci—graphs of simple function—equations of curves—standard equations of the straight line—circle and conic sections—parametric representations.

Calculus:

Derivatives, Applications to gradients, turning values—integration, definite integrals, simple problems.

II. ECONOMICS.

A paper of the same standard as for the Diploma in Economics will be set.

III. STATISTICAL METHODS.

A paper of the same standard as in B.A., Group (i—c) will be set.

IV. APPLIED STATISTICS:

Sources of Statistics, their character and meaning.

Economic Statistics:

Index numbers, application to statistics of production, prices, trade, wages, cost of living, etc. Income and capital analysis of time series—general trend, seasonal fluctuations, cyclinical fluctuations—application to monetary statistics, trade, etc. Economic survey—crop forecasts.

Vital Statistics:

Census, distribution of population by sexes, age, occupation, etc. Birth rate and death rate—standardized rates.

Agricultural Statistics :

Including design of experiments, crop forecasts—Agricultural experiments, randomization, replications, randomized blocks. Latin squares.

Education Statistics:

Intelligence and achievement test—Intelligent quotient—achievement scores—reliability and validity of tests—correlation between scores.

SPECIAL SUBJECTS.

1. *Actuarial Statistics*:

Compound interest and annuities. Graduation—construction of life table from census and life office data. Force of mortality—expectation of life—mortality tables. Single and annual premium for life and endowment policies. Capital redemption assurance. Surrender and paid-up values. Reserve values.

2. *Economic Statistics*:

An advanced study of the topics included under Applied Statistics.

3. *Mathematical Economics and Econometrics*:

Conditions of perfect and imperfect competition. Demand, function and curves. Elasticity of demand. Total average and marginal cost. Equilibrium analysis. Problem of monopoly, duopoly, monopolistic competition and perfect competition. Indifference curves. Production function and surface. Constant output curves. Elasticity of substitution. Equilibrium of production and its variation. Problems in the theory of value and the theory of interest.

Theoretical construction and evaluation of fundamental economic concepts. Use of methods of regression in the above.

4. *Vital Statistics and Population Problems*:

An advanced study of the problems included under applied statistics including use and construction of life tables, etc.

Different theories about the growth of population and estimates of rate of growth. Fertility rates, composition of families and other allied problems.

5. *Agricultural Statistics*:

Design of field experiments. Randomization. Replication. Randomized Blocks. Latin Squares. Analysis of variance and co-variance. Optimum size of plots and blocks. Complex experiments. Interaction of factors. Orthogonal and confounded experiments. Seasonal effects. Rotation experiments. Correlation of time-series. Correlation between meteorological conditions and crop-yields. Crop forecasts. Crop-cutting experiments. Statistics of agricultural economics. Cost of production. Sampling surveys. Preparation of forms and schedules.

LIST OF TEXT-BOOKS.

Reference:

Mathematical Statistics:

Fisher: Statistical Methods for Research Workers.

Yule and Kendall: An Introduction to the Theory of Statistics.

Bowley: Elements of Statistics.

Jones: A First Course in Statistics.

Tippet: Elementary Statistics.

Economic Statistics:

Crum and Patten: Economic Statistics.

Conor: Statistics in Theory and Practice.

Boddington: Statistics and their application to Commerce.

A scheme for an Economic Census of India: A Report by Bowley and Robertson.

F. C. Mills: Statistical Methods applied to Economics and Business, 1924, New York.

Vital Statistics and Actuarial Methods:

Newsholme: Vital Statistics.

Pearl: Medical Biometry.

Spurgeon: Life Contingencies.

Todhunter: Institute of Actuaries Book on Interest and Annuities.

G. S. Whipple: Vital Statistics, 1923, New York.

Educational Statistics:

Thompson & Brown: Essentials of Mental Measurement.

Rugg: Statistical Methods applied to Education.

Sankhya: Papers relating to intelligence tests—Volume I.

Agricultural Statistics:

R. A. Fisher: Design of Experiments.

Snedecer: Analysis of Variance and Co-variance.

Thomas and Sastry: Indian Agricultural Statistics.

Mathematical Economics and Econometrics:

R. G. D. Allen: Mathematical Analysis for Economics.

Joan Robinson: Economics of Imperfect Competition.

Papers in Economics, Review of Economic Studies, Econometrika, Journal of Royal Statistical Society and Sankhya.

Diploma in Modern European Languages.

GERMAN.

Syllabus.

First Term.—The work will include the elements of grammar and pronunciation, the use of simple sentences and translation (prepared and unseen). (One of the text-books may be read).

Second Term.—Grammar (continued); more advanced translation; reading of prescribed text-books; conversation.

Third Term.—Translation (a) German-English. (b) English-German, conversation and correspondence, completion of prescribed text-books; free composition.

Certificate in French.

1949.

Victor Hugo: La Chute (Heath).

Henry Pauthier: Le Petit Louis (U.T.P.)

1950.

La Poudre aux yeux by Labiche et Martin, Heath's edition.

De la Terre a la Lune by Jules Verne, edited by J. B. Petterson (O.U.P.)

Diploma in French.

1949.

Moliére: Le Misanthrope.

Moffatt: Science French Course, (U.T.P.) pp. 121 to 155, 285 to 300.

1950.

1. Science French Course, by C.W.P. Moffat, University Tutorial Press (O. U. P.), same portion as for 1949—(Pages 121 to 155, 285 to 300).
2. L' Avare: Moliére (O. U. P.)

Certificate in German.

1949.

Sack Thompson: A Practical German Course.

Ewing: Hie und Da (G. Bell & Sons.)

1950.

A. Blades: A Modern German Course (London University Tutorial Press).

Hie und Da, by Ewing (Bell's Graduated Rapid German Readers).

Diploma in German.

1949.

Schiller : Don Carlos.

Otto Koischwitz : Introduction to Scientific German.

1950.

Goethe :. Hermann und Dorothea.

Otto Koischwitz : Introduction to Scientific German.

Diploma Course in Librarianship.

SYLLABUS.

1. *Bibliography I*:
   1. Printing.
   2. Paper-making.
   3. Binding.
   4. Make-up of the book.
   5. Bibliographical description.
2. *Bibliography II*:
   1. National bibliographies.
   2. Subject bibliographies.
   3. Universal bibliographies.
   4. Bibliography of bibliographies.
3. *Book Selection*:
   1. Sources.
   2. Evaluation.
   3. Routine.
4. *Library Organization*:
   1. Laws of Library Science.
   2. Library legislation.
   3. Library systems.
   4. Library planning.
   5. Library building.
   6. Library furniture.
5. *Library Administration*:
   1. Ordering and accessioning of books and periodical publications.
   2. Library accounts.
   3. Library records and filing.
   4. Issue methods.
   5. Shelf work.

6. *Classification*:

   1. Theory of classification.
   2. Congress scheme (outlines).
   3. Colon and Dewey schemes (detailed).

7. *Cataloguing*:

   1. Physical form.
   2. Internal form.
   3. Cataloguing rules for a classified catalogue and a dictionary catalogue.

8. *Reference Work*:

   1. Source materials.
   2. Evaluation and use.
   3. Routine.

Syllabus for the Diploma Course in Geography.

(1) *The Physical Basis of Geography*, including the elements of Meteorology, Oceanography, and Geomorphology.

Meteorology.—The Atmosphere, distribution and variation of insolation, temperature, pressure, humidity, and precipitation, and the causes of this distribution and variation. Movements of the atmosphere and their causes, storms. Classification of climates.

Oceanography.—Distribution of temperature and salinity in the oceans. Movements of the water, tides.

Geomorphology.—The Influence of rock-texture, tectonic movements, and volcanic activity on relief. The evolution of fluvial, glacial, aeolian and littoral topography. Theories to account for the present distribution of land and sea. Structure and development of the present land-masses.

Reading and discussion of weather charts.

(2), (3) & (4) *General Regional Geography of the World* with a special study of the Regional Geography of India and any one of the continents. (The particular continent will be prescribed from time to time).

Regional Geography of India:

Relief and Structure: Physiographic regions.

Climate: Temperature, rainfall, monsoons, climatic regions.

Agriculture and land utilisation: Irrigation.

Industrial Geography.

Natural Regions.

Distribution of Population (Provinces and States).

(5) A Short Course in one of the following:—

(a) Historical Geography.

(b) Political Geography.

(c) Economic Geography.

(d) Bio-Geography.

(e) Anthropo-Geography.

SYLLABUS FOR ECONOMIC GEOGRAPHY.

1. *Scope of the subject.*—Stages of economic development.

2. *Agriculture.*—Economic and geographic aspects—methods and types—irrigation. Conditions of growth, distribution and trade in relation to the following:—cereals—pulses—sugar—fruit—spices—oil-seeds—fibres: cotton, jute, mulberry, (Silk), etc. Plantation crops: tea, coffee, rubber and tobacco.

3. *Animal husbandry.*—World distribution of cattle and sheep—meat and dairy produce—wool.

4. *Forestry.*—Temperate and tropical forests—forest products and industries—trade in forest products—conservation.

5. *Fisheries.*—World's chief fishing grounds—inland fisheries—fish trade.

6. *Mineral resources.*—Coal—iron—petroleum—other metals and minerals. Production, distribution and associated industries.

7. *Industrial development.*—Manufactures—factors of localisation—power resources (coal, oil, hydro-electric power)—supply and efficiency of labour—raw materials. The

industries associated with sections 2 to 6 above with special reference to the following: cotton and jute, iron and steel, and chemical industries.

8. *Distribution of population.*—Colonisation and emigration.

9. *Distribution and Exchange.—Transport*: Methods and development—ocean routes—inland waterways—ports—land transport—road and rail—air transport. Markets —trade policies.

(6) *Practical Geography.*—

(a) Elementary Surveying: including the use of the chain, the prismatic compass, the clinometer, the aneroid barometer, the plane table and the measurements of the horizontal angle with the theodolite.

(b) Elementary Map Projections: The more important and elementary types of the following:—

(1) Conical projections.

(2) Cylindrical projections.

(3) Zenithal projections (centre being the pole).

(4) All world projections.

(c) Interpretation of large scale topographical maps, both Indian and British.

(d) Diagrammatic representation of geographic data.

Candidates will be expected to submit their practical geography notebooks; and 100 marks will be allotted for it.

Scheme of field work:

i. Conducting land utilisation surveys of selected villages.

ii. Field study and mapping of physical environment, *i.e.* topography, soil, water supply, climate, and natural vegetation in relation to agriculture and other occupations in selected areas.

iii. The mapping and analysis of the patterns of human settlement in selected areas.

The field work records submitted by the candidates will be valued as a part of the examination, and after valuation, they will be returned to the Department for custody as they are to be construed as the property of the Department.

Selected Continent for Regional Study:

1949 and 1950.

ASIA.

Text-books.

Mathematical Geography—Jameson and Ormsby—Volume I—(Pitman).

Geographical Interpretation of Topographical Maps — Alice Garnett (Harrap).

The Continent of Asia—L. W. Lyde. (Macmillan & Co.).

North America—Rodwell Jones. (Methuen).

Systematic Geography—Part I—Willis. (Philip).

A Systematic Regional Geography—Unstead. (University of London Press.)

Land Forms and Life—C. C. Carter (Christophers).

Mapwork and Practical Geography—Bygott (Univ. Tutorial Press).

The Unstable Earth—Steers.

The Physical Basis of Geography; Geomorphology—Wooldridge and Morgan. (Longmans).

For Reference:—

Climate—Kendrew (Oxford University Press).

South America—Shanahan (Methuen).

Australia—Griffith Taylor (Oxford University Press).

Continent of Europe—Lyde (Macmillan & Co.).

Africa—Fitzgerald (Methuen).

Text-book of Geology : Part I—Longwell, Knopf and Flint.

Climates of the Continents—Kendrew (Oxford University Press)

Climatology—A. Miller. (Methuen).

Ocean—Murray (Home University Library) (Butterworth).

Oceanography—Johnstone.

An Outline of the Field Sciences of India—Edited by Sunder Lal Hora (Indian Science Congress Assn., Calcutta).

Imperial Gazetteer of India—3 Vols. (Excluding Historical Volume).

Handbook of Commercial Geography—Chisholm and Stamp (Longmans).

Oxford Advanced Atlas, (Oxford University Press) or Philip's University Atlas (Longmans).

Winterbotham : Key to the Interpolation of Maps.

Debenham: Exercises in Cartography.

Syllabus for the Diploma Course in Indian Music.

Theory.

Indian Music and its place amongst the musical systems of the world. Distinctive features of Indian Music.

Detailed knowledge of the notation used in South Indian Music. Svara nomenclature. Musical Terms : Nada, Sruti, Svara, Svarasthana and Sthayi ; Vadi, Samvadi, Anuvadi and Vivadi; Avarta, Matra, Gati, Aksharakala, Sangati.

The raga concept: Raga lakshana in general. Raga classification in modern music. The 72 Melakarta scheme. The two nomenclatures for the 72 Melas. Katapayadi formula and its application.

Lakshana and sanchara of the following 51 ragas :—

Todi.	Sriraga.	Suddha Saveri.
Dhanyasi.	Madhyamavati.	Kedara.
Asaveri.	Sriranjani.	Arabhi.
Punnagavarali.	Darbar.	Begada.
Ahiri.	Kanada.	Bilahari.
Mayamalavagaula.	Mukhari.	Nilambari.
Nadanamakriya.	Huseni.	Athana.
Gaula.	Harikambhoji.	Devagandhari.
Gaulipantu.	Mohana.	Nata.
Saveri.	Kedaragaula.	Varali.
Chakravaka.	Surati.	Pantuvarali.
Vasanta.	Natakuranji.	Purvakalyani.
Saurashtra.	Sahana.	Shanmukhapriya.
Bhairavi.	Khamas.	Simhendramadhyama.
Anandabhairavi.	Kambhoji.	Kalyani.
Ritigaula.	Sankarabharana.	Saranga.
Kharaharapriya.	Hamsadhvani.	Yadukulakambhoji.

Manodharma Sangita and its forms. Paddhati in Raga alapana, Kalpana svaras and Niraval.

Twenty-two srutis and the discussions relating thereto. Nomenclatures for the 22 srutis.

Alankara. Gamakas.

The scheme of the 35 Talas. Desadi and Madhyadi talas. Detailed knowledge of the Tala dasa pranas.

Musical forms and their classification. Lakshana of the musical forms figuring in Art music, Sacred music, Dance music and Opera.

Prabandha, Thaya, Suladi and other ancient forms.

Folk music and its characteristics.

Musical Prosody.

Musical appreciation. Styles of great composers. Critical study of two compositions each of Tyagaraja, Muthuswamy Dikshitar and Syama Sastri and one each of any six of the other composers mentioned in paragraph 3 below under History.

Musical instruments and their classification. The principal concert instruments of South India: their construction and use. Tuning of the stringed instruments; Tambura, Vina, Gotuvadya and Violin.

Types of Sarira; the Larynx and the Ear.

Contemporary Music.

Melody, Polyphony and Harmony. An outline knowledge of Staff notation.

Acoustics.—Production and transmission of sound. Musical sounds and intervals; Pitch, Intensity and Timbre; Harmonics; Resonance; sympathetic vibration. Echoes; Beats. Scales of just intonation and equal temperament. Absolute pitch and relative pitch. Modal shift of tonic. Laws of vibration of stretched strings.

Gramophone; Radio. Acoustics of concert halls.

History.

Origin and development of scales. Raga classification in Ancient Music. The *Trayodasa* lakshanas mentioned for ragas in the ancient Sanskrit works. Musical forms and their evolution. History of the Vina.

An outline knowledge of the works of the following lakshanakaras and the historical value of their works:—

Bharata (Natya Sastra).

Matanga (Brhaddesi).

Parsvadeva (Sangita Samaya Sara).

Narada (Sangita Makaranda).

Sarangadeva (Sangita Ratnakara).

Ramamatya (Svaramelakalanidhi).

Somanatha (Raga Vibodha).

Raghunatha (Sangita Sudha).

Venkatamakhi (Chaturdandi Prakasika).

Ahobala (Sangita Parijata).

Tulajaji (Sangita Saramrita).

Govindacharya (Sangraha Chudamani).

History and development of South Indian Music with special reference to the contributions of the following composers along with short biographies of these composers:—

Jayadeva.
Tallapakam Chinnayya.
Purandara Das.
Arunagirinathar.
Narayana Tirtha.
Kshetrajna.
Sarangapani.
Bhadrachala Ramadas.
Sadasiva Brahmendra.
Virabhadrayya.
Margadarsi Seshayyangar.
Pachimiriam Adiyappiah.
Paidala Gurumurti Sastri.
Ramaswamy Dikshitar.
Tyagaraja.
Muthuswamy Dikshitar.
Syama Sastri.
Svati Tirunal.
Muthu Thandavar.
Arunachala Kavirayar.
Gopalakrishna Bharati.
Kavi Kunjara Bharati.
Subbaraya Sastri.
Merattur Venkatarama Sastri.
Pallavi Gopalayyar.
Pallavi Duraiswami Iyer.
Anayya.
Vina Kuppayyar.
Ghanam Krishnayyar.
Mysore Sadasiva Rao.
Subrahmanya Kavi.
Ponnayya.
Subbarama Ayyar of Vaidisvarankovil.
Karur Dakshinamurti Sastri.
Muvvalur Sabhapati Ayyar.
Tachur Singaracharlu.
Ramaswamy Sivan.
Maha Vaidyanatha Ayyar.
Dharmapuri Subbarayar.
Pattabhi Ramayya.
Tiruvottiyur Tyagayyar.
Ramnad Srinivasa Ayyangar.

Principal seats of music during the 17th, 18th and 19th centuries in South India.

Influences of exotic music on the development of South Indian Music.

Practical.

Twelve Gitas including two lakshana gitas. One svarajati of Syama Sastri. Eight Varnas including three in ata tala and one in jhampa tala; two Ashtapadis, two Tarangas, four Padas, one Padavarna, two Ragamalikas, two Tillanas, two of Tyagaraja's Pancharatnam and the following compositions.

Alapana of the following 30 ragas:—

Todi, Dhanyasi, Mayamalavagaula, Saveri, Chakravaka, Vasanta, Saurashtra, Bhairavi, Anandabhairavi, Ritigaula, Kharaharapriya, Madhyamavati, Mukhari, Kānada, Mohana, Kedaragaula, Surati, Sahana, Kambhoji, Yadukulakambhoji, Khamas, Sankarabharana, Bilahari, Begada, Athana, Pantuvarali, Purvakalyani, Shanmukhapriya, Kalyani, Saranga.

Rendering of Kalpana svaras to compositions learnt in the following ragas :—

Todi, Mayamalavagaula, Bhairavi, Kambhoji, Sankarabharana, Kalyani and any other ten ragas mentioned for Alapana (above) and in the following talas :—

Adi, Rupaka, Triputa, Chapu and Jhampa.

In the practical examination, the candidates may offer Vocal music, or one of the following instruments:—

Vina, Gotuvadya, Violin, Flute.

Excepting the Vina candidates, other candidates shall sing or play to the sruti accompaniment of the Tambura.

Compositions prescribed.

1949, 1950 and 1951.

Todi—Ninne namminanu.

Dhanyasi—Namoralakinchi.

Asaveri—Lekana.

Punnagavarali—Kanaka saila.

Mohana—Bhavanuta.

Kedaragaula—Venuganaloluni.

Surati—Edukkittanai.

Natakuranji—Dasarathim.

Ahiri—Etula kapaduduvo.

Mayamalavagaula—Tulasidalamulache.

Nadanamakriya—Intaparaka.

Gaula—Dudukugala.

Gaulipantu—Tarunamidamma.

Saveri—Srirajagopala.

Chakravaka—Arivudayor.

Vasanta—Sitamma.

Saurastra—Suryamurte.

Bhairavi—Sriparthasarathe.

Anandabhairavi—Pahi sri.

Ritigaula—Janani.

Kharaharapriya—Kori sevimpa.

Sriraga—Sri Kamalambike.

Madhyamavati—Palimchu Kamakshi.

Sriranjani—Bhuvi nidasudane

Darbar—Minanayana.

Kanada—Gaurinayaka (Tillana).

Mukhari—Pahimam.

Huseni—Alagite.

Harikambhoji—Rama nannu.

Sahana—Ivasudha.

Kambhoji—O Ranga Sayi.

Yadukulakambhoji—Kalaitukki.

Khamas—Kommaro.

Sankarabharana—Sarojadalanetri.

Hamsadhvani—Manasukaruga.

Suddhasaveri—Ennathukkudavi.

Kedara—Nivenajivamani.

Arabhi—Chutamu rare.

Begada—Inta parakela.

Bilahari—Tolijanma.

Nilambari—Amba Nilayatakshi.

Athana—Elanidayaradu.

Devagandhari—Karunasamudra.

Nata—Jagadanandakaraka.

Varali—Marakatamani.

Pantuvarali—Vaddante (Pada).

Purva Kalyani—Paripurnakama.

Shanmukhapriya—Marivere.

Simhendramadhyama—Mammubrochu.

Kalyani—Nidu charana.

Saranga—Nivada.

Note:—The Compositions prescribed are only indicative of the standards expected and it is open to the Colleges and Institutions to teach alternative pieces of equal standard.

As examples of Compositions of equal standard, the following are suggested :—

Vasanta	...	Natanamadinar
Kalyani	...	Parengum

Books for Reference.—

1. Bharata's Natya Sastra, Matanga's Brhaddesi, Narada Siksha, Sarangadeva's Sangita Ratnakara, Ahobala's Sangita Parijata,

Ramamatya's Svaramelakalanidhi, Somanatha's Ragavibodha, Govinda Dikshita's Sangita Sudha, Venkatamakhi's Chaturdandiprakasika, Tulajaji's Sangita Saramrta, Govindacharya's Sangraha Chudamani.

2. Sangitasampradayapradarsini, Singaracharlu's works, Pallavisvarakalpavalli of Tiruvottiyur Tyagayyar, Abraham Panditar's Karunamrita Sagaram, Ganabhaskara of K. V. Srinivasa Ayyangar, Tala and Pallavi portions of Sangitakaumudi of Tiruvayyar Subrahmanya Ayyar, Pallavi Parijata of Vedanta Bhagavatar, Ganavidyaprakasini by Perungulam Srinivasa Ayyangar, Sankirtana Ratnavali by Tiruvottiyur Tyagayyar.

3. Helmholtz's Sensations of Tone, Sound by Richardson, Acoustics of Auditoria by Davis and Kaye, Music of Hindustan by Fox Strangways, Musical Instruments in the Indian Museum, Calcutta by Dr. Meerwarth, Madras Museum Bulletin on South Indian Musical Instruments by P. Sambamurti, Syama Sastri and other composers by P. Sambamurti, Melakarta and Janyaraga scheme by P. Sambamurti, Tyagaraja by M. S. Ramaswami Ayyar, The Journal of the Music Academy, Madras, Kirtanasagaram, Book III by P. Sambamurti, Songs by T. Lakshmana Pillai. Acoustics in Tamil by R. K. Visvanathan, Dikshitar's Compositions by Nataraja Sundaram Pillai, South Indian Music, Books 1 to 3 by P. Sambamurti, The Nowka Charitra of Thyagaraja, edited by P. Sambamurti, The 72 Melaragamalika of Maha Vaidyanatha Ayyar, edited by Sabhesa Ayyar, Kirtanasagaram, IV by P. Sambamurti, Tanjai Peruvudayan Perisai, by K. Ponniah Pillai, Sangita Sudha, Tamil Translation of Chadurdandiprakasika and Sangita Saramrta, published by the Music Academy, Madras, Grammar of South Indian Music, by C. S. Ayyar, Sangita Lakshana Sangraha by A. S. Murti, Tala Dipika by K. Ramachandran, South Indian Music, Book IV by P. Sambamurti, Purandaramanimāla by Lalitangi, "Flute" by P. Sambamurti, Second Edition, Introduction to the Study of Musical Scales by Alain Danielou, Sangita Martanda.

Certificates and Diploma in Anthropology.

Syllabus.

1. SOCIAL AND CULTURAL ANTHROPOLOGY.

Development of group life ; hunting ; pastoral and agricultural stages of life ; grouping of villages.

Forms of social organization; the family, the tribe, the clan, the joint family. Matrilineal and patrilineal societies. Rules of descent, inheritance and succession.

Kinship grouping; descriptive and classificatory systems of relationship, marriage classes; dual organization. Kinship usages; parent-in-law taboos.

Early history of marriage. Forms of marriage ; monogamy, polygamy, polyandry. Means of acquiring a mate ; dowry and bride price. Laws regulating marriage ; enjoined and prohibited marriages ; exogamy and endogamy. Marriage ceremonies and their functions. Divorce.

Sexual life. Birth ceremonies. Naming of children. Puberty and initiation ceremonies.

Clubs and associations.

Treatment of the dead and funeral ceremonies.

Primitive religion; pre-animistic religion; mana and taboo; animism; fetishism, totemism ; ancestor worship and cult of the dead. Magical and religious practices. Sympathetic and symbolic magic.

Law and justice. Customary nature of primitive law. Blood feud. Chiefs or headmen in primitive society. Property. Land tenure. Primitive communism.

Mythology. Folklore and folk-songs. Folk-dances. Amusements and recreations. Children's games. Agricultural and seasonal ceremonies or festivals.

Primitive material culture. Procuring of food. Cultivation and domestication of animals. Primitive methods of agriculture. Agricultural, hunting and fishing implements. Domestic arts and crafts ; pottery, basketry, spinning and weaving ; metal working. Fire-making appliances. Weapons. Methods of Transport.

Decorative arts; personal ornament and decoration. Artificial deformation or mutilation of the person. Clothing. Habitation. Music and musical instruments.

Primitive trade, barter, currency. Modes of reckoning time.

Note.—In addition to a broad general survey of primitive Sociology and Culture a detailed study should be made of a selected primitive tribe of India for which literature is available.

2. PHYSICAL ANTHROPOLOGY AND ETHNOLOGY.

Man's place among mammals. Distinctive characteristics. Elements of human anatomy and comparative anatomy of man and anthropoid apes.

Evolution of man. Fossil primates and types of early man; Australopithecus; pithecanthropus erectus; Sinanthropus Pekinensis; Eoanthropus Dawsoni; Homo Rhodesiensis; Homo Hidelbergensis; Homo Neanderthalensis; Homo Sapiens; the Grimaldi and cro-Magnan race; Neolithic man.

Methods of anthropometry. Principal anthropometric measurements and working out of statistics. Measurements on the Living—stature; head and face. Examination of skulls. Cranial measurements; cephalic, facial and nasal indices.

Principles of racial classification. Main races of living men and their geographical distribution. Mediterranean, Alpine, Nordic, Mongoloid, Negroid and Australoid races. General survey of the racial history of the peoples of Asia, Europe, Africa, America and Australasia.

Racial classification of the peoples of India. Some typical primitive Indian tribes; Veddahs, Andamanese, Kadirs and Paniyans.

Practical Work.—Identification of the more important bones of man and important somatological landmarks on the living and on skulls. Use of the various anthropometric instruments. Examination of types of hair and study of photographs of living types of man, especially of primitive types in South India.

3. PREHISTORIC ARCHAEOLOGY.

Development of prehistoric research and modern conceptions of the origin and antiquity of man.

Geological background; the geological epochs and the principal types of fossils characteristic of them. The Ice ages. Glacial remains

Geology in relation to man. Development of primates in the Eocene and Oligocene, Anthropoids in the Eocene. Evidence of early man in the Pliocene. Further development in the Pleistocene.

Stone implements. Geological evidence of relative antiquity. Indications of age; patination, abrasion, position in deposits.

Sequence of prehistoric culture and associated fauna; Eolithic; Paleolithic; Mesolithic; Neolithic.

Mesolithic civilization. Azilian, Tardenoisean and transition to Neolithic. Bone implements; pigmy flints; kitchen midden remains; first devolpment of grinding.

Neolithic civilization. Evidence of domestication of animals and agricuture. Types of stone implements. Hafting. Habitations. Burials. Stone monuments.

Bronze and Iron Ages. Brief outline of development of culture. Evidence of prehistoric man in Asia. Place of India in the prehistory of Asia. Stone Age cultures of North-Western India.

Stone Age man in South India. Distribution. Influence of accessibility of materials suitable for implements. Paleolithic sites in the vicinity of Madras and Chingleput, North Arcot and Nellore districts. Implements in laterite deposits.

The Metal Age in India. Evidence of direct succession of neolithic by Iron Age culture. The calcolithic civilization of the Indus valley.

Development of Pottery. Types of prehistoric pottery.

Urn and Sarcophagi burials. Megalithic monuments and structures. Dolmens in Southern India.

Racial migrations in Paleolithic, Neolithic, Bronze and Early Iron Ages in Europe and Asia.

Practical Work.—Examination and identification of types of stone implements.

List of Text-Books.

1. *Social and Cultural Authropology*:

   R. H. Lowie: Introduction to Cultural Anthropology (Harrap, London).

   Horniman Museum and Library Series:—(1) Evolution of Domestic Arts, Parts I and II. (2) War and Chase.

R. U. Sayce: Primitive Arts and Crafts. (Cambridge University Press, 1933).

R. H. Lowie: Primitive Society.

W. H. R. Rivers: The Todas.

W. H. R. Rivers: Social Organisation.

F. Boas: General Anthropology.

British Association for the Advancement of Science—Notes and Queries in Anthropology.

2. *Physical Anthropology and Ethnology*:

C. P. Stibbe: An Introduction to Physical Anthropology (Edward Arnold & Co., 1945).

A. C. Haddon: Races of Man (Cambridge University Press).

B. S. Guha: Oxford Pamphlets of Indian Affairs—1944—Racial Elements in the Population.

William H. Gilbert: The Peoples of India. (Smithsonian Institution, Washington).

3. *Prehistoric Archaeology*:

A. Vayson de Pradenne: Prehistory (Harrap). (Translated by E. F. Row).

Horniman Museum and Library Series—From Stone to Steel. (Horniman Meseum, Forest Hill, London.)

R. Bruce Foote: Indian Prehistoric and Protohistoric Antiquities (in two volumes), Government Press, Madras.

G. G. MacCurdy: Human Origins.

Selected primitive tribe of India for detailed study under Social and Cultural Authropology:—

The Kanikkar of Travancore.

APPENDIX XXVII.

DIPLOMA IN PHYSICAL EDUCATION.

Syllabus.

(1) ORGANISATION AND ADMINISTRATION OF PHYSICAL EDUCATION.

The objectives of education and physical education.

The psychological, physiological and biological characteristics—Classification of activities—Classification of children.

Health and Health Education.

The Physical Education Department.

The Physical Education Budget.

The purchase of equipment and supplies.

The care of the field equipment and supplies

The principles of programme planning.

The Elementary School programme.

The Junior High School Programme.

The programme in Senior High School.

The College programme.

Physical Education Class details.

Methods of presenting subject-matter.

Lesson Plan.

Student leadership.

Intramural programme—House system.

Intramural programme—Athletics.

Intramural competitions and tournaments.

Awards and Point system—Incentives.

Marks and credits in Physical Education.

Facilities and standards.

Time-table.

The conduct of Sports.

The conduct of Tournaments.

The Inter-school Tournaments.

The Inter-school Sports.

Tests and measurements.

Maintenance of records and registers.

World record. India record. Province record. District record.

Physical Education library journals.

Professional interest and promotion of Physical Education.

The teacher of Physical Education and his work.

The ideal teacher of Physical Education.

Reference Books.

1. The Administration of Physical Education by Jay B. Nash.
2. The Organization and Administration of Physical Education by E. F. Voltmer and A. A. Eislinger.
3. Administration of Health and Physical Education by J. F. Williams and C. L. Brownell.
4. Modern Principles of Physical Education by J. R. Sharman.
5. Intramural Sports by E. D. Mitchel.
6. Conduct of Physical Education by Mabel Lee.
7. Physical fitness for boys by Ben Miller, Karl Bookwalter and George Schlafer.

(2) ANATOMY, PHYSIOLOGY AND HYGIENE

The course on Anatomy, Physiology and Hygiene is the foundation course for Health and Physical Education. The course will include a study of the structure, functions and the hygiene or care of the various organs of the body.

1. Discussions about the origin of life.
2. Evolutionary adaptations of man.
3. The Cell and its parts, functions of living cells, Human embryology—Heredity.
4. The skeletal system—The nature of the human skeleton—Growth of bone—Plan of the skeleton—The spinal column—Movements of the spine—Defects of the spine—Injuries to the spine—The pelvic girdle—Male and female—Pelvis—The thorax—The extremities—The foot.

Hygiene of the skeletal system—The matter of posture—Values of good posture.

5. The skeletal muscles—The attachment of muscles—Contraction of muscles—The Chemistry of muscles—Muscles of abdominal wall—back, thorax, chest, neck, head and face, scapula, arm, forearm, hand, pelvis, thigh, leg and foot.

Hygiene of the muscular system—Rational exercise and its benefits—The sedentary life—Exercise adapted to age and sex—Relative value of different activites.

6. The circulatory systems—General arrangement of the circulatory system—The blood—Haemorrhage—Transfusion—Immunity—The heart—Valves of the heart—Valvular heart-How the heart works—Sounds of the heart—Valvular lesions of the heart—arrangement of the blood vessels—The pulmonary circulation—The systematic arteries—Pulse—Blood pressure and its measurements.

Hygiene of the circulatory system—Importance of circulation—Functions of the R.B.C. and W.B.C.—Functions of the plasma—Immunity—Influence of tobacco—Physical training and its influence on the heart, blood circulation and blood pressure.

7. The Respiratory system—The Pharynx—The Larynx, the trachea, the bronchi, the lungs—The mechanism of the thorax—Inspiration — Expiration — Vital capacity — The exchange of gases—Asphyxia.

Hygiene of the respiratory system—Control of dust and dirt—Bacteria in air—the value of sunlight—Breathing exercises—Health of the respiratory system—Colds, Tonsils, Adenoids, etc.—Tuberculosis.

8. The digestive system—The abdomen—The mouth, teeth, aesophagus, the stomach, the intestines and the liver—Digestion in the mouth—Digestion in the stomach—Digestion in the intestines—Absorption—Metabolism.

Nutrition—The essentials of a balanced diet—Dietary standards—Food deficiency diseases—The mal-nourished child—Signs and symptoms of malnutrition—Assessing nutrition.

Hygiene of mouth, teeth, etc.

9. The Excretary system—The kidneys—How the kidneys secrete urine—Composition of the urine—The skin and its appendages—The excretion of sweat.

   Hygiene of the Excretory system—The skin as an index of health—Care of the hair—Care of the nails—Care of hands—Clothing—Keeping the kidneys efficient—Constipation.

10. The Endocrine system—The nature of the internal secretions —The Thyroid, the Para-thyroids, the Adrenal and the Pituitary.

11. The Nervous system—Development of the nervous system—The neuron—The spinal cord—Reflex action—Type reactions in the nervous system—The brain—The divisions of the brain—Cerebral localization—The automatic system.

    Hygiene of nervous system—The normal mental life—Development of wholesome mental habits—Insanity—Causes and types—Mental health—Alcohol and the nervous system—Sleep and the nervous system.

12. Study of the special organs, eye and ear.

    Hygiene of the eye and ear.

    Testing of visual accuity.

    Testing of hearing.

13. Physiology of exercise and training—Muscular work—Physical and chemical change in muscular activity.

    Role of oxygen in exercise. Oxygen belt.

    Exercise and its influence in Recreation.

    Exercise and vital capacity.

    Exercise and the heart.

    Effect of frequent and regular exercise. Fatigue and staleness.

    Tests of physical fitness.

Reference Books.

1. Furneaux's Human Physiology.
2. Exercise and its Physiology—Gould and Dye.
3. Anatomy and Physiology by J. F. Williams.
4. Physiology of muscular activity—Schneider.
5. Physiology of Exercise—McCurdy and Larson.

(3) HEALTH EDUCATION.

Wholesome and nutritious food.

Outdoor life which ensures plenty of fresh air.

Clean and well-ventilated hostels.

Clean dining rooms and kitchens.

Sanitary latrines.

Good bathing facilities.

Exercises, games, sports, etc., of the right type.

Preventive and Prophylactic measures.—

Doctor to take care of the sick and the injured.

Protective inoculations against typhoid, cholera, etc.

Thorough physical and medical examination, recording of findings and efficient follow-up and correction of defects discovered

Theoretical courses (Lectures).—

Anatomy and Physiology.

Personal Hygiene.

Nutrition.

First aid.

Home Hygiene.

School Hygiene.

Community Hygiene.

Health Education.—

(i) An analysis of the Health problems in India—the expectancy of life—high maternal and infantile mortality—diseases —illiteracy and ignorance—superstitions—customs—habits—lack of sanitary consciousness, etc.

(ii) Physical health—Physiological health—Mental health—Relationship of body and mind.

(iii) Science and health—The approach to knowledge of health —Superstition, custom, taboo, etc.—The scientific approach to the problem of health, disease—The right attitude.

(iv) Health of the school child—Statistical data available regarding childhood defects—Causes of the common

defects of childhood—Responsibilities of parents and school—School health service—Health institution—Health supervision.

(v) Health of the family—economic status—standard of living—food—water supply—housing—cleanliness—disposal of refuse—prevention of infection—family doctor.

(vi) Health of the community and the Nation—Public health services—Study of tropical diseases—their causes, spread, prevention, etc.

Books for study and reference.

1. Masani—Our India.
2. Norman Walker—Indian Village Health.
3. Grant—Health of India.
4. Williams—Personal Hygiene applied.
5. Chenoweth and Selkirk—School Health Problems.

(4) FIRST-AID AND SAFETY EDUCATION.

1. A. Outlines and principles of First-Aid.

   B. Fractures—Causes, varieties, signs and symptoms.

   C. Treatment of fractures—General rules.

   D. The Triangular Bandage—Its application to the head, chest, back, shoulder, elbow, hand, hip, knee and foot—Arm slings. (Large, small and St. John.)

2. Individual fractures—Details of treatment—The skull, lower jaw, spine, ribs, breast-bone, collar-bone, shoulder-blade, arm, forearm, hand, pelvis, thigh, knee-cap, leg and foot.

   Dislocations, sprains, strains—Signs, symptoms and treatment.

   Practice—Treatment of fractures.

3. A. Wounds and haemorrhage.

   B. Wounds accompanied by arterial haemorrhage.

   C. The situation of the main arteries—Pressure points.

   D. Wounds accompanied by capillary or venous haemorrhage—Varicose veins.

   E. Haemorrhage from special regions—Bruises.

   F. Practice—Compression of arteries.

4. Injuries to internal organs—Haemorrhage.

Miscellaneous injuries—Burns, poisoned wounds, frost-bite, foreign bodies.

Practice—Treatment of fractures and haemorrnage (as in 2 and 3).

5. Respiration—Natural and artificial.

Asphyxia.

Insensibility.

Practice—Artificial respiration.

6. Poisons.

Transport of the injured:—

(i) For males, Hand seats and Stretcher Exercises.

(ii) For females, Hand seats only.

Preparation for the reception of accident cases.

Reference Books.

1. First-Aid to the Injured—Cantle.
2. First-Aid Text-books—American Red Cross.
3. First-Aid—George G. Deaver.
4. First-Aid to the injured—Warwick.
5. First-Aid for St. John's Ambulance—Dr. U. Rama Rao.

(5) RULES OF GAMES, COACHING, ETC.

1. *Coaches*:

How to condition and train a team, how to build offence and defence play, how to develop game strategy and tactics, how to organize and administrate a team.

2. *Officials*:

Some of the requisites of a good official briefly are:—

(1) Honesty. (2) Courage. (3) Efficient split vision. (4) Physical fitness. (5) Good voice. (6) Firmness. (7) Businesslike attitude. (8) Knowledge of the rules and techniques. (9) Commonsense. (10) Sense of humour. (11) Poise.

3. Rules:

Major and Minor Games—Track and Field Sports—Aquatics.

Reference Books.

Softball:	Noren
Basketball:	Murphy
Track & Field:	Conger
Swimming:	Kiphuth
Cricket:	Jardine
Volleyball:	Laveaga
Football:	Caswell
Boxing:	Kennedy
Wrestling:	Ottopalik
Rules of Games and Sports:	Buck

(6) PRINCIPLES AND PHILOSOPHY OF PHYSICAL EDUCATION.

1. The Functional Basis of Physical Education:

Philosophy of Physical Education (Old and New).

Physical Education, a Profession.

2. The Scope of Physical Education:

The field of Physical Education.

The need for a co-ordinated programme of Physical Education, Recreation and Health Education.

3. Objectives of Physical Education.

4. The Biological Foundation of Physical Education:

The Biological basis of life.

The effect of heredity and environment.

The development of the human skeleton.

The development of the muscular system.

Chronological, Anatomical, Physiological and Mental age.

Difference in males and females.

The Athletic heart.

Unsynchronized development.

The function of the nervous system.

Reciprocal innervation.

Muscle Tone.

The relation of energy to life.

Factors that influence energy requirements.

Respiration.

Body Types of Physique.

5. *Psychological Foundations of Physical Education*:

The relation of mind and body—Impulses, drives, urges and habits—The learning processes. Practical suggestions from Psychology.

6. *Sociological Foundatian of Physical Education*:

Aspects of contemporary Indian Culture—Competition and Co-operation—Social forces and Social inheritance.

7. *Leadership in Physical Education*:

Well prepared teachers.

Characteristics and standards of fitness for entering the profession.

Essentials of good teaching.

8. *Character Building through Physical Education.*

9. *Principles of Athletics*:

Content of Athletic programme.

Training Athletics.

Objectives for Inter-collegiate athletics.

An athletic platform for girls.

10. *Planning*:

a. The importance of planning.

b. Standards for judging method.

c. The essential provisions for period of teaching.

d. The daily lesson plan.

e. The use of devices in teaching Physical Education.

f. Foundations of motivation.

Reference Books.

1. Introduction to Physical Education—J. R. Sharman.
2. Modern Principles of Physical Education—J. R. Sharman.
3. The Teaching of Physical Education—J. R. Sharman.
4. Principles of Physical Education—J. F. Williams.
5. Introduction of Physical Education—Nixon & Cozens.
6. The Modern Teacher of Physical Education—Baker.
7. Elementary Principles of Physical Education—Thorndike & Gates.
8. A Modern Philosophy of Physical Education—A. R. Wayman.
9. Physical Education, Recreation and Health Education, a study—C. C. Abraham.
10. Physiology and Anatomy—Greishmair.
11. Interpretation of Physical Education—Jay B. Nash.
12. Character and Camping (Chapter III)—Dimoak and Hendry.

(7) HISTORY OF PHYSICAL EDUCATION.

I. Status of Physical Education in the Primitive Society:

1. Character of the Primitive Society.
2. Practical Education.
3. The origin of some Physical Education.

II. Physical Education in the ancient Oriental nations-China and India.

III. Physical Education in Greece:

Homeric, Historic and transitional ages—Spartan and Athenian—Olympic games.

IV. Physical Education among the Romans and during the dark ages:

The Circus, Thermal and Gladiatorial combats—Physical Education in the Age of Chivalry.

V. Physical Education during the Renaissance and the 18th Century:

Influence of Naturalism on the Practice of Physical Education—Influence of John Locke, Pestallozzi, Herbert and Froebel on Physical Education.

VI. Physical Education in Germany, Denmark, Sweden:

1. Schools and literature of Basidown-Selzman, Guto-muths, John Spiss Nachigal and Ling.
2. The Turnvereine (German gymnastic society).
3. Demilitarisation of school gymnasium.
4. Play movement.
5. Royal central institution of gymnastics.
6. Scientific approach to physical education and physical education in the Universities.

VII. Physical Education in France, Great Britain and other European countries:

1. Revival of Olympics.
2. Origin of British Sports.
3. Gymnastics in Great Britain and Health Movement.

VIII. Physical Education in America:

1. Colonial period and the play instinct of the colony.
2. National period and the growth of academies.
3. Physical Education in American Universities and Schools.
4. Recreational movement—camping movement, and health educational movement.

IX. The origin and development of various games—Cricket, Foot-ball, Hockey, Basketball, Polo, Tennis, Kho-Kho, and Kabaddi.

X. Survey of Modern Physical Education in India.

Reference Books.

1. Brief History of Physical Education by E. A. Rice.
2. Physical Education in Indian Schools by Dr. G. F. Andrews.
3. Physical Education in the Y.M.C.A.

ANNEXURE I.

FORMS OF CERTIFICATE OF ATTENDANCE.

$\frac{\text{F.L.}}{\text{B.L. Degree}}$ EXAMINATION.

I certify that the following candidates have kept three-fourths of the attendances prescribed by the..College, ...in the course of instruction in Law during the year, that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the $\frac{\textit{F.L.}}{\textit{B. L. Degree}}$ *Examination.*

Dated............................*19* . *Principal.*

No.	Name of candidate.
1	......
2	......
3	......
4	......

M.B. & B.S. Degree Examinations.

PRE-REGISTRATION EXAMINATION.

I certify that the following candidates have kept four-fifths of the attendances prescribed by the...............................College, ...in the course of instruction in Inorganic Chemistry, Physical and Natural Science during a period of at least two terms subsequent to their passing the Intermediate Examination, and that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the Pre-Registration Examination.

Dated...........................*19* . *Principal.*

We certify that the following candidates have attended the course of instruction, both theoretical and practical, in the subjects for the Pre-Registration Examination during the two terms and that they have satisfactorily completed the course.

Professor or Lecturer in Chemistry.......................................

Do. do. Physics.......................................

Do. do. Natural Science..............................

Principal.

No.	Name of candidate.
1	......
2	......
3	......
4	......

FIRST M.B. & B.S. EXAMINATION.

PART I.

I certify that the following candidates have kept four-fifths of the attendances prescribed by the..............................*College*, ...*in the course of instruction in Organic Chemistry for a period of at least two terms subsequent to their passing the Pre-Registration Examination and that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for Part I of the First M.B. & B.S. Examination.*

I also certify that to the best of my knowledge and belief, they had completed the age of seventeen years on or before the date of admission to the First M.B. & B.S. Course.

Dated........................*19* . ***Principal.***

I certify that the following candidates have attended the course of instruction in Organic Chemistry, both theoretical and practical, for Part I of the First M.B. & B.S. Examination during a period of at least two terms and that they have satisfactorily completed the course.

Professor or Lecturer in Chemistry.......................................

Principal.

No.	Name of candidate.
1	......
2	......
3	......
4	......

FIRST M.B. & B.S. EXAMINATION.

PART II.

I certify that the following candidates have kept four-fifths of the attendances prescribed by the..................................College, ...in the course of instruction in the subjects prescribed for the First M.B. & B.S. Examination, Part II, during the two years subsequent to their admission to the First M.B. & B.S. course, that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the Examination.

I further certify that they have attended for one term during the second academic year a course of instruction in (1) the normal reactions of the body to injury and infection, etc., (2) elements of the methods of clinical examination, etc., and (3) introduction to Pharmacology, and have passed a test therein conducted by the College.

Dated.....................19 . *Principal.*

We certify that the following candidates have attended the course of instruction, both theoretical and practical, in the subjects prescribed for the First M.B. & B.S. Examination, Part II, and that they have satisfactorily completed the course.

Professor or Lecturer in Anatomy..
Do. do. Physiology..
Do. do. Biochemistry.......................................

Principal.

No.	Name of candidate.
1	......
2	......
3	......
4	......

SECOND M.B. & B.S. EXAMINATION.

PART I.

I certify that the following candidates have kept four-fifths of the attendances prescribed by the............................College, ...in the course of instruction in Pharmacology during a period of one academic year subsequent to passing the First M.B. & B.S. Examination, that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the Second M.B. & B.S Examination, Part I.

Dated.........................19 . *Principal.*

I certify that the following candidates have attended the course of lectures on Pharmacology and the course of instruction in Experimental Pharmacology, for a period of one academic year, prescribed for the Second M.B. & B.S. Examination, Part I, and that they have satisfactorily completed the course.

Professor or Lecturer in Pharmacology..................................

Principal.

No.	Name of candidate.
1	......
2	......
3	......
4	......

SECOND M.B. & B.S. EXAMINATION.

PART II.

I certify that the following candidates have kept four-fifths of the attendances prescribed by the.....................................College, ...in the course of instruction in Hygiene and Preventive Medicine for a period of one academic year, and in Pathology and Bacteriology for a period of two academic years, subsequent to passing the First M B. & B S. Examination, that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the Second M.B. & B.S. Examination, Part II.

Dated..............................19 . *Principal.*

We certify that the following candidates have attended the course of instruction, theoretical, practical and clinical, in the subjects prescribed for the Second M.B. & B.S. Examination, Part II, and that they have satisfactorily completed the course.

Professor or Lecturer in Pathology..................................

Do. do. Hygiene and Preventive Medicine..................................

Do. do. Bacteriology..................................

Principal.

No.	Name of candidate.
1	......
2	......
3	......
4	......

FINAL M.B. & B.S. DEGREE EXAMINATION.

PART I

I certify that the following candidates have kept four-fifths of the attendances prescribed by the..................................*College*, ...*in the course of instruction in Forensic Medicine and in Ophthalmology prescribed for the Final M.B. & B.S. Degree Examination, Part I, that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the examination.*

I further certify that they had passed the Second M.B. & B.S. Examination before entering on their fifth or final year of medical study.

Dated...........................*19* . *Principal.*

I certify that the following candidates have attended the course of instruction in Forensic Medicine and in Ophthalmology prescribed for the Final M.B. & B.S. Degree Examination, Part I, and that they have satisfactorily completed the course.

Professor or Lecturer in Forensic Medicine..........................

Do. do. Ophthalmology..................................

Principal.

No.	Name of candidate.
1	......
2	......
3	......
4	......

FINAL M.B. & B.S. DEGREE EXAMINATION.

PART II.

I certify that the following candidates have kept four-fifths of the attendances prescribed by the.................... ....College, ...in the course of instruction in the subjects prescribed for the Final M.B. & B.S. Degree Examination, Part II, that their conduct and progress have been satisfactory, and that they have completed the course of study prescribed for the Examination.

I further certify that they have been engaged in the study of the clinical subjects for not less than three years subsequent to passing the First M.B. & B.S. Examination, that their fourth and fifth years of the course of studies prescribed for the Final M.B. & B.S. Degree Examination had been spent in attendance at the University of Madras and that they have passed the Second M.B. & B.S. Examination at least one year previously.

I also certify that they have been engaged as clinical clerks and surgical dressers, as the case may be, in the maternity, medical and surgical wards and out-patient departments of a recognised hospital for the period prescribed, and that they have also put in the prescribed attendance at a recognised Maternity Hospital, or the maternity wards of a General Hospital.

I also certify that they have undergone the course of study prescribed in the various subjects under Medicine and Surgery, under Regulation 33 (iii) and Regulation 34 (iv), respectively, of the Laws governing the M.B. & B.S. Degree Examination.

Dated.................. ....19 . *Principal.*

We certify that the following candidates have attended the course of instruction, theoretical, practical and clinical, in the subjects

prescribed for the Final M.B. & B.S. Degree Examination, Part II, and that they have satisfactorily completed the course.

Professor or Lecturer in Medicine..............................
Do. do. Surgery..............................
Do do. Obstetrics & Gynaecology..............
Physician,........................Hospital,..............................
Surgeon,........................Hospital,..............................
Superintendent, Maternity Hospital,..............................

Principal.

No.	Name of candidate.
1	...
2	...
3	...
4	...

ADDITIONAL ATTENDANCE CERTIFICATE FOR CANDIDATES WHO FAILED IN THE EXAMINATION, OR WHO, AFTER APPLYING FOR ADMISSION, DID NOT APPEAR FOR THE EXAMINATION, OR WHO HAVING OBTAINED THE PRESCRIBED ATTENDANCE CERTIFICATE, DID NOT APPLY FOR ADMISSION TO THE EXAMINATION.

*I certify that............................has been re-engaged in the prescribed course of studies for the............................Examination during the period between the last examination *............................at which he failed or did not appear, and the succeeding examination, and that his progress and conduct have been satisfactory.*

Dated....................19 . *Principal.*

ADDITIONAL ATTENDANCE CERTIFICATE FOR CANDIDATES WHO FAILED IN PART II OF THE FINAL M. B. & B. S. DEGREE EXAMINATION.

I certify that......................has put in a further attendance at hospital practice in............................of Part II of the Final M.B & B.S. Degree Examination, for the period between the examination held on............................at which he failed and the succeeding examination, and that his progress and conduct have been satisfactory.

Physician, or Surgeon, or
Superintendent,............................Hospital,..........................

Dated............................19 . *Principal.*

* The date of the examination must be entered here.

DEGREE OF DOCTOR OF MEDICINE (M.D.)

BRANCH I—MEDICINE.

I certify that.., having passed the M.B. & B.S. Degree Examination of the University of Madras, has been engaged for not less than five years continuously in active practice of Medicine.

Station......................

Principal,.....................College,...........
Date .... *Superintendent,............Hospital,.........*

I certify that.., after qualifying for the M.B. & B.S. Degree of this University, has been a house surgeon in a General Hospital for a period of not less than twelve months, of which six months, at least, has been spent in the medical wards, and has held, for a period of not less than two years subsequently, an appointment on the medical side as..................in this Hospital|College.

Professor,
Station...................... *Principal,* *.....................College,............*

Date........................ *Superintendent,...............Hospital,.........*

I certify that.., after qualifying for the M.B & B.S. Degree of the University of Madras, has been in the active practice of medicine for a period of three years, and has held, for a period of not less than two years, subsequently, an appointment on the medical side, as..................................in this Hospital|College.

Professor,
Station...................... *Principal,* *.....................College,...........*

Date........................ *Superintendent,..............Hospital,.........*

BRANCH II—MIDWIFERY INCLUDING DISEASES OF WOMEN AND CHILDREN

BRANCH III-A—PATHOLOGY (MAIN) AND BACTERIOLOGY (SUBSIDIARY)

BRANCH III-B—BACTERIOLOGY (MAIN) AND PATHOLOGY (SUBSIDIARY)

I certify that.., after qualifying for the M.B. & B.S. Degree of the University of Madras, has been a resident house surgeon in a General Hospital for a period of not less than one year or has been in the active practice of medicine for a period of not less than three years, and has held, for a period of not less than two years subsequently, an appointment as.................... in the...............................Department of this Hospital|College.

Professor,
Station...................... *Principal,* *....................College,...........*

Date........................ *Superintendent,..............Hospital,.........*

DEGREE OF DOCTOR OF MEDICINE (M.D.) / MASTER OF SURGERY (M.S.)

(FOR CANDIDATES OF OTHER UNIVERSITIES)

I certify that.., after qualifying for the M.B & B.S. Degree of the University of ...., has been engaged continuously in the active practice of medicine, / surgery, for a period of not less than five years, and has subsequently

** completed a course of one academic year at least in this institution,*

† completed a course of not less than two academic years in the ....Department of this institution,

and satisfies the conditions laid down by the University for the admission of candidates of other Universities for the M.D.|M.S. Degree Examination.

Station.....................

Date .... *Principal,..................College,..............*

DEGREE OF MASTER OF SURGERY (M.S.)

BRANCH I—GENERAL SURGERY.

I certify that..having passed the M.B. & B.S. Degree Examination of the University of Madras, has been engaged for not less than five years continuously in the active practice of surgery.

Station.....................

Principal,... ....College,............
Date........................ *Superintendent,..............Hospital,.........*

I certify that..after qualifying for the M.B. & B.S. Degree of this University, has been a house surgeon in a General Hospital for a period of not less than twelve months, of which six months at least have been spent in the surgical wards, and has held, for a period of not less than two years subsequently, an appointment on the surgical side as...... ....in this Hospital|College.

Station.................... *Professor, / Principal, ...College,.........*

Date........................ *Superintendent,..............Hospital,. ....*

*Applies only to candidates for Branch I—Medicine—in the case of the M.D. Degree or Branch I—General Surgery—in the case of the M.S. Degree.

†Applies to candidates offering one of the specialities—Branches II, III-A and III-B, in the case of the M.D. Degree, and Branch II in the case of the M.S. Degree.

I certify that..after qualifying for the M.B. & B.S. Degree of the University of Madras, has been in the active practice of Surgery for a period of three years, and has held, for a period of not less than two years subsequently, an appointment on the surgical side, as......................in this Hospital|College.

Station....................... *Professor, / Principal,* *......................College,...........*

Dated....................... *Superintendent,..............Hospital,.........*

BRANCH II—SPECIAL SUBJECTS.

(OTO-RHINO-LARYNGOLOGY; OPHTHALMOLOGY; ORTHOPAEDICS).

I certify that.., after qualifying for the M.B. & B.S. Degree of the University of Madras, has been a Resident House Surgeon in a General Hospital for a period of not less than one year or has been in the active practice of surgery for not less than three years, and has held, for a period of not less than two years subsequently, an appointment as...................... ...in the ....Department of this Hospital|College.

Station....................... *Professor, / Principal,* *......................College,..........*

Dated....................... *Superintendent,............Hospital,..........*

POST-GRADUATE DIPLOMAS IN MEDICINE AND SURGERY.

(COMMON TO ALL DIPLOMAS)

I certify that...has, subsequent to passing the M.B. & B.S. Degree Examination, held a house appointment for a period of one year in a recognised hospital, of which at least six months have been on the medical side† / surgical side‡ and that, thereafter, he has attended for a period of twelve months the practice of a special hospital or the special wards of a general hospital dealing*

NOTE: * Candidates for the Diploma in Tuberculosis must have completed at least six months' House Surgeoncy on the Medical side and six months' House Surgeoncy on the Surgical side.

† "Medical side" for candidates for Diplomas in Gynæcology and Obstetrics, Dermatology and Venereology.

‡ "Surgical side" for candidates for Diplomas in Ophthalmology, Oto-Rhino-Laryngology, Radiology, and Orthopædics.

with the speciality, during which period he attended not less than twenty lecture demonstrations in the particular speciality.

Professor,
Principal, ...College,..........

Dated...................... *Superintendent,*..............*Hospital,*.......

or

I certify that..*has been in active practice for not less than three years subsequent to passing the M.B. & B.S. Degree Examination, and that thereafter, he has attended for a period of twelve months the practice of a special hospital or the special wards of a general hospital dealing with the speciality, during which period he attended not less than twenty lecture demonstrations in the particular speciality.*

Professor,
Principal, ...College,..........

Dated...................... *Superintendent,*..............*Hospital,*.......

CERTIFICATE OF ADDITIONAL ATTENDANCE.

I certify that.., *who failed in the Examination for the Diploma in*..................*held in*...................... *has attended an additional course of one term or three months.*

Professor,
Principal, ...College,..........

Dated......................

DIPLOMA IN GYNÆCOLOGY AND OBSTETRICS.

I certify that..*has served as a House Surgeon in this Hospital for a period of six months, and that he/she has conducted not less than six Obstetric operations under the supervision of the medical staff during this period.*

Dated...................... *Superintendent,*..............*Hospital,*.......

I certify that..*has, subsequent to six months' house surgeoncy, given regular attendance at the Government Hospital for Women and Children, Madras, for a period of six months and has attended the lectures and clinical demonstrations prescribed, covering not less than thirty clinical lecture demonstrations on Obstetrics and Gynaecology during the period.*

Dated...................... *Superintendent, Government Hospital for Women and Children, Madras.*

DIPLOMA IN VENEREOLOGY.

I certify that..*has been in regular attendance in the Venereal Department of this Hospital for a period*

of one academic year, and has during the period attended the course of study prescribed, consisting of not less than twenty lecture demonstrations and instruction in laboratory technique and public health aspect of venereal diseases, and that he/she has undergone training for two weeks in serology and for one month in dermatology.

Dated........................ *Superintendent*,..............*Hospital*,.... ...

DIPLOMA IN DERMATOLOGY.

I certify that........................... ....*has been in regular attendance at this Hospital/in the Dermatological Department of this Hospital for a period of one year, and that he/she has during the period attended the course of study prescribed covering not less than twenty lecture demonstrations, on the anatomy and physiology of the skin and on the diseases thereof, has attended the Venereal Department of the*.........................*Hospital during a period of two months, has put in the required attendance in a Leprosy clinic and infectious diseases hospital, and has attended a course of therapeutic radiology as applied to skin diseases for not less than three months (12 hours) in*..........................

Dated........................ *Superintendent*,............. *Hospital*,........

DIPLOMA IN OPHTHALMOLOGY.

* *I certify that*..*has served as a House Surgeon in this Hospital/in the Ophthalmic wards of this Hospital for a period of six months.*

Dated........................ *Superintendent*,..............*Hospital*,.... ...

I certify that...*has, subsequent to six months' house surgeoncy, received practical instruction in Ophthalmology in this Hospital for a period of six months/twelve months, and has during the period, attended a course of not less than thirty clinical lecture demonstrations prescribed for the Diploma Examination.*

Dated.......... .... *Superintendent, Government Ophthalmic Hospital, Madras.*

DIPLOMA IN OTO-RHINO-LARYNGOLOGY.

I certify that..*has attended this Hospital/the Ear, Nose and Throat Department of this Hospital for a period of six months/twelve months, and has during the period attended the course of lectures and demonstrations prescribed for*

Part I of the Diploma Examination.

Part II or Parts I and II of the Diploma Examination.

Dated........................ *Superintendent*,...........*Hospital*,.... ...

**NOTE*: This certificate is not necessary in the case of those receiving practical instruction for 12 months.

DIPLOMA IN RADIOLOGY.

I certify that..has attended the Radiological Department of this Hospital for a period of six months / twelve months and has during the period attended the course of theoretical and practical instruction prescribed for Part I of the Diploma Examination. / Part II or Parts I and II of the Diploma Examination.

Dated......................... Superintendent,...............Hospital,........

DIPLOMA IN ORTHOPÆDICS.

I certify that..has attended this Hospital for a period of twelve months, and has during this period attended the course of theoretical and practical instruction prescribed for the Diploma and conducted in the Orthopaedic Department (both in-patients and out-patients) of this hospital.

Dated........................ .....Superintendent,...............Hospital,...........

DIPLOMA IN TUBERCULOSIS.

I certify that..has completed a course of study extending over a period of twelve months conducted in institutions recognised by the University, of which six months have been spent in an institution attached to this College.

Professor, / Principal, ...College,.......

Dated..................19 . Superintendent,............. Hospital, ...

B.S.Sc. DEGREE EXAMINATION.

PART I.

I certify that, subsequent to his having obtained a registrable medical qualification recognised by the University, Mr.................... ....has regularly attended the courses of instruction in the subjects shown below and that he has performed the work thereof in a satisfactory manner:

(*i*) *Chemistry and Physics in relation to Public Health, including laboratory work (180 hours).*

(*ii*) *Bacteriology, including laboratory work (220 hours).*

(*iii*) *Medical Entomology and Parasitology, including laboratory work (180 hours).*

(*iv*) *Climatology and Meteorology (10 hours).*

....

Professor of Hygiene, Medical College.

Dated...............19 .
MADARS,
Countersigned.

....

Principal, Medical College, Madras.

PART II.

I certify that, subsequent to his having obtained a registrable medical qualification recognised by the University, Mr...................... ....has regularly attended the courses of instruction in the subjects shown below, that he has performed the work thereof in a satisfactory manner, that he has passed the Examination in Part I for the B.S.Sc. Degree, and that two years have elapsed since he obtained a registrable medical qualification recognised by the University:—

(i) *Principles of Public Health (50 hours).*

(ii) *Epidemiology and Vital Statistics (20 hours).*

(iii) *Sanitary Law and Administration (20 hours).*

(iv) *Sanitary Construction and Planning (30 hours).*

(v) *Vaccination (30 hours).*

(vi) *Tuberculosis (30 hours).*

(vii) *Venereal Diseases (10 hours).*

(viii) *Attendance on the practice of a Hospital for Infectious Diseases (60 hours).*

(ix) *Instruction in Public Health Administration under the Medical Officer of Health of the City of Madras (180 hours).*

....
Professor of Hygiene, Medical College.

Dated.....................19 .
MADRAS,
Countersigned.

....
Principal, Medical College, Madras.

B.Sc. (PHARMACY).

I certify that the following candidates have kept three-fourths of the attendances prescribed by the...............................College, ...in the course of instruction and practical training in B.Sc. (Pharmacy) during the two terms/four terms, that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the B.Sc. (Pharmacy) Degree Examination.

Dated.....................19 .

Principal.

No.	Name of candidate.
1	......
2	......
3	......

ADDITIONAL ATTENDANCE CERTIFICATE FOR CANDIDATES WHO FAILED IN ANY SUBJECT OR SUBJECTS OF THE B.SC. (PHARMACY) FINAL EXAMINATION.

I hereby certify that...has undergone a further course of study for at least one academic term in ....in which he failed in the examination held in........................

Dated......................19 . *Principal.*

BACHELOR OF SCIENCE IN NURSING.
INTERMEDIATE EXAMINATION IN SCIENCE IN NURSING.

PART I/PART II/PART III.

I certify that the following candidates have kept three-fourths of the attendances prescribed by the..................................College, ...in the course of instruction and/or practical training in the Intermediate Examination in Science in Nursing during the two years, that their conduct and progress have been satisfactory, and that they have completed the course of study prescribed for the Intermediate Examination in Science in Nursing.

No.	Name of candidate.
1	......
2	......
3	......

Professor of or Lecturer in.................................... ....
Do. do. ....
Do. do. ....

....
Dated......................19 . Principal,..............College,...........

B.Sc. (NURSING)

PART I/PART II/PART III.

I certify that the following candidates have kept three-fourths of the attendances presribed by the......................................College, ...in the course of instruction and/or practical training in the Bachelor of Science in Nursing during the two years, that their conduct and progress have been satisfactory, and that they

have completed the course of study prescribed for the B. Sc. (Nursing) Degree Examination.

No.	Name of candidate.
1	......
2	......
3	......

*Professor of or Lecturer in**..

Do. do. *..

Do. do. *..

....

Dated....................*19* . *Principal*,...........*College*,..............

ADDITIONAL ATTENDANCE CERTIFICATE FOR FAILED CANDIDATES.

I certify that..*has been re-engaged in the prescribed course of study in Part II and/or Part III of the B.Sc. Degree in Nursing Examination during the period between the last exmination*†..................................*at which he failed or did not appear, and the succeeding examination, and that his progress and conduct have been satisfactory.*

....

Dated....................*19* . *Principal*,.............*College*,...........

BACHELOR OF ENGINEERING DEGREE EXAMINATIONS.

(*New Regulations.*)

FIRST B.E. EXAMINATION.

SECOND B.E. EXAMINATION.

THIRD B.E. EXAMINATION—

........................BRANCH.

FINAL B.E. DEGREE EXAMINATION—

........................BRANCH.

I certify that the following candidates have kept three-fourths of the attendances prescribed by the......................*College*,........*in the course of instruction and practical training in Engineering during*

*Here enter the particular subject.

†The date of the examination must be entered here.

the year, that their conduct and progress have been satisfactory, and that they have completed the course of study prescribed for the First B. E.|Second B. E.|Third B. E.........Branch|Final B. E. Degree...........Branch Examination.

No.	Name of candidate.
1	......
2	......
3	......

Dated..........19 . ....

Principal.

B.E. DEGREE
B.T. DEGREE
M.Ed. DEGREE
B.Sc. (Ag.) DEGREE
} EXAMINATION.

I certify that the following candidates have kept three-fourths of the attendances prescribed by the................................College, ...in the course of instruction and practical training in Engineering|Teaching|Agriculture during the year|years, that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the B.E. Degree| B.T. Degree|M.Ed. Degree|B.Sc. (Ag.) Degree|Examination.

Dated................19 . *Principal.*

No.	Name of candidate.
1	......
2	......
3	......

B. T. DEGREE EXAMINATION.

(PRACTICAL TEST).

The report from the Colleges on the Practical Test should be in the following form :—

All candidates have been examined in 5 lessons in each of the subjects against their names.

The following candidates are declared to have passed the Practical Test :—

Name of Student.	Optional Subjects.
...	...
...	...
...	...

*The following candidates are presented for *re-examination by the University in their optional subjects:—*

Name of Student.	Optional Subjects.
...	...
...	...
...	...

*(i) The deferred candidates shall be examined by two Examiners appointed by the Syndicate (one expert in each of the candidate's optional subjects).

(ii) Each deferred candidate shall be examined on at least one lesson in each optional subject.

(iii) There shall be only one practical test each year for the deferred candidates.

B. V. Sc. DEGREE EXAMINATION.

I certify that the following candidates have kept three-fourths of the attendances prescribed by the Madras Veterinary College, in the course of instruction and practical training prescribed, if any, during the year|years, that their conduct and progress have been satisfactory and that they have completed the course of study prescribed for the B. V. Sc. Degree.

Examination — *Preliminary* / *Intermediate* { Part I / Part II } / *Final*

Dated..................19 .

Principal,
Madras Veterinary College.

(*Here enter the particular subject.)

NOTE:—This will include:

(*a*) Hospital attendance for

(i) one academic year in the case of Intermediate, Part II Examination:

(ii) three terms in the case of Final Examination.

(*b*) Practical Training in a Farm for

(i) one and a half months in the case of Intermediate, Part I:

(ii) one and a half months in the case of Intermediate Part II:

(iii) three and a half months at the end of the third and fourth years of study in the case of Final Examination.

B.Sc. (Tech.) DEGREE EXAMINATION.

PART I/PART II.

I certify that the following candidates have kept eighty per cent of the attendances prescribed (lectures and practical classes) during the year/the two years, have satisfied a test conducted by the Department, their progress and conduct have been satisfactory, and that they completed the course of study prescribed for the B.Sc. (Tech.) Degree.

....

Lecturer in German.

....

Professor of or Lecturer in *..............................

do *do* *..............................

Dated..................*19* . *do* *do* *..............................

Principal or

Head of the University Department.

B. Com. DEGREE EXAMINATION.

PART I

I certify that the following candidates have kept three-fourths of the attendances prescribed by the..................*College*,.................., *in the course of instruction in Part I during one year, that their conduct and progress have been satisfactory and that they have*

* Here enter the particular subject.

completed the courses of study prescribed for the examination in Part I for the B.Com. Degree.

Dated..............19 . *Principal.*

No.	Name of Candidate.
1	......
2	......
3	......

B. Com. DEGREE EXAMINATION.

PARTS II AND III.

I certify that the following candidates have kept three-fourths of the attendances prescribed by the......................College,..............., in the course of instruction in Part II (A Second Language) during one year, and Part III during the two years, that their conduct and progress have been satisfactory and that they have completed the courses of study prescribed for the examination in Parts II and III of the B.Com. Degree.

Dated..............19 . *Principal.*

No.	Name of candidate.	Second Language.	Optional subject under Part III.
1	...	...	...
2	...	...	...
3	...	...	...

B. Com. (Honours) DEGREE EXAMINATION.

PART I.

I certify that the following candidates have kept three-fourths of the attendances prescribed by the......................College,..............., in the course of instruction in Part I during one year, that their conduct and progress have been satisfactory and that they have completed the courses of study prescribed for the examination in Part I for the B.Com. (Honours) Degree.

Dated..............19 . *Principal.*

No.	Name of candidate.
1	......
2	......
3	......

B. Com. (Honours) DEGREE EXAMINATION.

PART II.

I certify that the following candidates have kept three-fourths of the attendances prescribed by the......................College,..............., in the course of instruction and practical training prescribed in the Regulations under Part II during the three years, that their conduct and progress have been satisfactory, and that they have completed the courses of study prescribed (both theoretical and practical) prescribed for the examination in Part II of the B.Com. (Honours) Degree.

Dated..............19 . *Principal.*

No.	Name of candidate.
1	......
2	......
3	......

EXAMINATION FOR THE CERTIFICATE / DIPLOMA IN { ECONOMICS. POLITICS AND PUBLIC ADMINISTRATION. STATISTICS. EUROPEAN LANGUAGES. LIBRARIANSHIP. GEOGRAPHY. INDIAN MUSIC. ANTHROPOLOGY. JOURNALISM. }

I certify that the following candidates have attended during the two years / the year three-fourths of the course of lectures and classes arranged for the benefit of candidates for the Certificate/Diploma, that they have under my supervision systematically followed the

course of study prescribed and that their conduct and progress have been satisfactory.

Dated......................19 . *Professor or Lecturer.*

No.	Name of candidate.
1	......
2	......
3	......
4	......

EXAMINATION FOR THE DIPLOMA IN PHYSICAL EDUCATION.

I certify that the following candidates have attended during the year three-fourths of the course of instruction (both theoretical and practical), that their progress and conduct have been satisfactory, and that they have completed the courses of study prescribed for the Diploma in Physical Education.

Dated......................19 . *Principal.*

No.	Name of candidate.
1	...
2	...
3	...

ANNEXURE II.

TIME-TABLES FOR EXAMINATIONS.

First Examination in Law.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Jurisprudence ...	100
Second day ...	10—1	Roman Law ...	100
Third day ...	10—12	Indian Constitutional Law ...	70
Fourth day ...	10—1	The Law of Torts ...	100
Fifth day ...	10—1	Contracts, including Negotiable Instruments and Specific Relief I	100
Sixth day ...	10—1	Contracts, including Negotiable Instruments and Specific Relief II	100
		Total ...	570

B.L. Degree Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Law of Property I (Real Property, Trust and Easement) ...	100
Second day ...	10—1	Law of Property II (Transfer of Property Act) ...	100
Third day ...	10—12	Madras Land Tenures ...	70
Fourth day ...	10—1	Hindu Law ...	100
Fifth day ...	10—12	Muhammadan Law ...	70
	2—4	Law of Evidence ...	80
Sixth day ...	10—1	Criminal Law ...	100
		Total ...	620

M.L. Degree Examination.

BRANCH I—JURISPRUDENCE.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Jurisprudence ...	100
Second day ...	10—1	History of English Law ...	100
Third day ...	10—1	Roman Law and general outline of the French and German Civil Law. ...	100
Fourth day ...	10—1	Ancient Law and Polity ...	100
Fifth day ...	10—1	Legislation, method and interpretation. ...	100
		Total ...	500

BRANCH II—CONSTITUTIONAL LAW AND INTERNATIONAL LAW.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Constitutional Law—India and the British Commonwealth. ...	100
Second day ...	10—1	Constitutional Law—The United States, France and Switzerland.	100
Third day ...	10—1	Public International Law ...	100
Fourth day ...	10—1	Private International Law ...	100
Fifth day ...	10—1	Public Authorities, Corporations and Elections. ...	100
		Total ...	500

BRANCH III—CRIME AND TORT.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Theory of Crime and Punishment.	100
Second day ...	10—1	Development of Criminal Law and Procedure in England and in India ...	100
Third day ...	10—1	Comparative Criminal Jurisprudence ...	100
Fourth day ...	10—1	Torts—General Principles ...	100
Fifth day ...	10—1	Torts—Specific Wrongs ...	100
		Total ..	500

BRANCH IV—CONTRACTS INCLUDING MERCANTILE LAW.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Contracts—General Principles ...	100
Second day..	10—1	Contracts—Special Contracts ...	100
Third day ...	10—1	Banking and Negotiable Instruments ...	100
Fourth day.	10—1	Company Law and Bankruptcy ...	100
Fifth day ...	10—1	Insurance and Maritime Law (Merchant Shipping, Bills of Lading, Charter-parties and Collisions). ...	100
		Total ...	500

BRANCH V—HINDU, MUHAMMADAN AND OTHER PERSONAL LAWS.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Hindu Law—Domestic relations, inheritance and woman's property rights ...	100
Second day..	10—1	Hindu Law—The Joint Family ...	100
Third day ...	10—1	Hindu Law Codes and Commentaries—The Artha Sastra and the Mimamsa ...	100
Fourth day..	10—1	Muhammadan Law and its history ...	100
Fifth day ...	10—1	Statute Law in India relating to guardianship, marriage and succession ...	100
		Total ...	500

BRANCH VI—PROPERTY.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Transfer of Property in England and India, including trusts, settlements and conveyancing. ...	100
Second day...	10—1	Transfer of Property in England and India—Sales, mortgages and leases ...	100
Third day ...	10—1	Succession, testamentary and intestate.	100
Fourth day..	10—1	Public Trusts and Charities ...	100
Fifth day ...	10—1	Customary and Statute Law relating to land tenures in India. ...	100
		Total ...	500

Medical Examinations.

Pre-Registration Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Inorganic Chemistry (Written) ...	100
Second day ..	10—1	Physics (Written) ...	100
Third day ...	10—1	Natural Science (Written) ...	100
Dates and hours will be duly notified.	3 hours each.	Inorganic Chemistry (Practical) ...	100
		Physics (Practical) ...	100
		Natural Science (Practical) ...	100
		Total ...	600

First M. B. & B. S. Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Organic Chemistry (Written) ...	100
Second day..	10—1	Anatomy including Elements of Human Embryology (Written)	100
Third day ...	10—1	Physiology including Biophysics and Biochemistry (Written) ...	100
Dates and hours will be duly notified.	3	Organic Chemistry (Practical) ...	50
		Do. (Oral)	50
	3	Anatomy including Elements of Human Embryology (Practical) ...	50
		Do. (Oral) ...	50
	3	Experimental Physiology and Histology (Practical)	50
	2	Biochemistry (Practical)	30
		Physiology including Biochemistry (Oral)	50
		Physiology (Laboratory note-books) ...	20
		Total ...	650

Second M.B. & B.S. Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Pharmacology (Written) ...	100
Second day ...	10—1	Hygiene and Preventive Medicine (Written) ...	100
Third day ...	10—1	Pathology with Bacteriology (Written)	100
Dates and hours will be duly notified ...		Pharmacology (Practical) ...	50
		Do. (Oral) ...	50
		Hygiene and Preventive Medicine (Practical) ...	50
		Do. (Oral) ...	50
		Pathology with Bacteriology (Practical) ...	50
		Do. do. (Oral) ...	50
		Total ...	600

Final M.B. & B. S. Degree Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Forensic Medicine (Written) ...	100
Second day ...	10—1	Ophthalmology (Written) ...	75
Third day ...	10—1	Medicine I (Written) ...	100
Fourth day ...	10—1	Do. II do. ...	100
Fifth day ...	10—1	Surgery I (Written) ...	100
Sixth day ...	10—1	Do. II do. ...	100
Seventh day ...	10—1	Obstetrics and Gynaecology (Written) ...	100
Dates and hours will be duly notified.		Forensic Medicine (Oral) ...	50
		Ophthalmology (Oral) ...	25
		Do. (Clinical) ...	50
		Medicine (Clinical) ...	150
		Do. (Oral) ...	50
		Surgery (Clinical) ...	150
		Do. (Oral) ...	50
		Operative Surgery ...	50
		Obstetrics and Gynaecology (Clinical) ...	150
		Do do. do. (Oral) ...	50
		Total ...	1,450

M.D. Degree Examination.

BRANCH I.
Medicine.

Days.	Hours.	Subjects.
First day ...	10—1	Medicine including Pathology and Mental Diseases—First Paper.
Second day ...	10—1	Medicine—including Pathology and Mental Diseases—Second Paper.
Third day ...	10—1	Tropical Medicine.
Fourth day ...	10—4	Clinical and Oral Examinations, including examination of Pathological specim ens.

BRANCH II.
Midwifery, etc.

Days.	Hours.	Subjects.
First day ...	10—1	Medicine.*
Second day ...	10—1	Midwifery and Diseases of Women and Children, including Pathology-First Paper.
Third day ...	10—1	Midwifery and Diseases of Women and Children, including Pathology—Second Paper.
Fourth day ...	10—1	Essay.
Fifth day ...	10—4	Clinical and Oral Examinations, including examination of Pathological specimens.

BRANCH III-A.
Pathology (Main) and Bacteriology (Subsidiary).

Days.	Hours.	Subjects.
First day ...	10—1	Medicine*
Second day ...	10—1	Pathology—First Paper.
Third day ...	10—1	Pathology—Second Paper.
Fourth day ...	10—1	Bacteriology.
The dates and hours of Practical and Oral Examinations will be duly notified.		Practical and Oral Examinations in Advanced Pathology. Practical Examination in Bacteriology.

*Will be common to all candidates for the M.D. Degree Examination.

BRANCH III-B.

Bacteriology (Main) and Pathology (Subsidiary.)

Days.	Hours.	Subjects.
First day ...	10—1	Medicine.*
Second day ...	10—1	Bacteriology—First Paper.
Third day ...	10—1	Do. Second Paper.
Fourth day ...	10—1	Pathology.
Dates and hours of Practical and Oral Examinations will be notified later.		Practical and Oral Examinations in Advanced Bacteriology. Practical Examination in Pathology.

*Will be common to all candidates appearing for the M. D. Degree Examination.

M.S. Degree Examination.

BRANCH I—GENERAL SURGERY.

Days.	Hours.	Subjects.
First day ...	10—1	General Surgery—First Paper.
Second day ...	10—1	General Surgery—Second Paper.
Third day ...	10—1	Surgical Pathology and Anatomy.
Dates and hours of Clinical and Oral Examinations will be notified later.		Clinical Examination. Operative Surgery andt he use of instruments. Oral Examination, including slides, Pathological specimens, X-Ray plates, etc.

M. S. Degree Examination.

BRANCH II—SPECIAL SUBJECTS (1) OTO-RHINO-LARYNGOLOGY (2) OPHTHALMOLOGY (3) ORTHOPAEDICS.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Surgery*	
Second day ...	10—1	Special Subject, including Anatomy and Surgical Pathology of the Speciality—First Paper ...	
Third day ...	10—1	Do. Second Paper ...	
Fourth day ...	Dates and hours will be notified later.	Clinical Examination in General Surgery ...	
Fifth day ...		Clinical Examination in the Special Subject ...	
Sixth day ...		Practical and Oral Examinations in the Special Subject including Examination of Pathological specimens, Slides, X-Rays, use of special instruments and operations.	

*Common for all candidates appearing in the special subjects.

Examination for the Diploma in Gynaecology and Obstetrics.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Obstetrics. ...	100
Second day ...	10—1	Gynaecology and Diseases of a new born child ...	100
Days and hours will be notified later.		Clinical and oral examinations ...	100
		Total ...	300

Examination for the Diploma in Venereology.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Written Examination ...	100
Days and hours will be notified later.		Clinical Examination ...	100
		Oral Examination ...	50
		Total ...	250

Examination for the Diploma in Dermatology.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Written Examination ...	100
Days and hours will be notified later.		Clinical Examination ...	100
		Oral Examination ...	50
		Total ...	250

Examination for the Diploma in Ophthalmology.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	First Paper:	100
		Part I—Anatomy and Physiology of the eye and optics ...	
		Part II—Bacteriology and Pathology of the eye ...	
Second day ...	10—1	Second Paper—Ophthalmic Medicine and Surgery, including Ophthalmology in its relation to general medicine ...	100
Dates and hours will be notified later		Clinical Examination ...	100
		Refraction and Dark Room Examination ...	100
		Pathological Specimens, Microscopic Slides, optical instruments and appliances ...	50
		Viva voce Examination ...	50
		Total ...	500

Examination for the Diploma in Oto-Rhino-Laryngology.

Days.	Hours.	Subjects.	Marks.
		PART I	
First day ...	10—1	Written Examination (The Anatomy, embryology, and physiology of the ear, nose, etc.) ...	100
		Practical and oral examinations ...	50
		PART II	
First day ...	10—1	Written Examination (Diseases and treatment of the ear, nose and throat) ...	100
		Clinical Examination ...	100
		Practical and oral examinations including slides, pathological specimens, instruments and operations ...	50

Note:—The dates and hours of the Practical, Clinical and Oral Examinations will be duly notified.

Examination for the Diploma in Radiology.

Days.	Hours.	Subjects.	Marks.
		PART I	
First day ...	10—1	Physics and minor electrical engineering—I Paper ...	100
Second day ...	10—1	Do. II Paper ...	100
		PART II	
First day ...	10—1	Diagnostic Radiology (Written Examination) ...	100
Second day ...	10—1	Therapeutic Radiology ...	100
		Practical and Oral Examinations...	100

Note:—The dates and hours of the Practical and Oral Examinations will be duly notified.

Examination for the Diploma in Orthopaedics.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Written Examination—I Paper ...	100
Second day ...	10—1	Do. do. II Paper ...	100
Third day ...		Clinical and practical examinations ...	150
Fourth day ...		Oral examination with pathological specimens, microscopic work, X-Rays, splints, etc. ...	50
		Total ...	400

Note:—The dates and hours of Clinical, Practical and Oral Examinations will be duly notified.

Examination for the Diploma in Tuberculosis.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Written Examination—I Paper: Pulmonary Tuberculosis including preventive aspect ...	100
Second day ...	10—1	Written Examination—II Paper: Non-Pulmonary Tuberculosis including Special Tuberculosis ...	100
Days and hours will be notified later.		*Practical, Clinical and Oral Examinations:* ...	
		Clinical Examination in the subjects covered by I Paper ...	100
		Clinical Examination in the subjects covered by II Paper ...	100
		Pathological specimens, microscopic slides, etc. (Practical) ...	50
		Viva voce ...	50
		Total ...	500

B.S.Sc. Degree Examination.

Part I

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Chemistry and Physics in relation to Public Health and Climatology and Meteorology (Written).	100
Second day ...	10—1	Bacteriology (Written) ...	100
Third day ...	10—12	Medical Entomology and Parasitology (Written) ...	100
Fourth day ...	10—2	Chemistry and Physics in relation to Public Health (Practical) ...	100
	3—5	Chemistry and Physics in relation to Public Health (Oral) ...	50
Fifth day ...	10—1	Bacteriology (Practical) ...	100
	2—4	Do. (Oral) ...	50
Sixth day ...	10—1	Medical Entomology and Parasitology (Practical) ...	100
	2—4	Medical Entomology and Parasitology (Oral) ...	50
		Total ...	750

Part II

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Hygiene and Preventive Medicine and Public Health including Sanitary Engineering (Written).	100
Second day ...	10—1	Epidemiology and Infectious Diseases (Written) ...	100
Third day ...	10—12	Sanitary Law and Vital Statistics (Written) ...	100
	2—5	Hygiene and Preventive Medicine and Public Health (Oral) ...	50
Fourth day ...	7—10	Epidemiology and Infectious Diseases (Practical) ...	50
	10—1	Epidemiology and Infectious Diseases (Oral) ...	50
	2—5	Sanitary Law and Vital Statistics (Oral) ...	50
Fifth day ...	7—1	Public Health Administration (report on sanitary inspection) .	150
		Total ...	650

B.Sc. (Pharmacy) Degree Examination.

PRELIMINARY.

Days.	Hours.	Subjects.	Marks.
First day ...	10—12	General Chemistry (Written) ...	100
Second day ...	2—5	Organic Chemistry (Written) ...	100
Third day ..	10—12	Botany (Written) ...	100
	2—4	Physiology (Written) ...	100
Fourth day ...	10—1	General Chemistry (Practical) ...	100
Fifth day ...	10—1	Organic Chemistry (Praotical) ...	100
Sixth day ...	10—1	Botany (Practical) ...	100
Dates and hours will be notified later.		General Chemistry (Oral) ...	50
		Organic Chemistry (Oral) ...	50
		Botany (Oral) ...	50
		Physiology (Oral) ...	50
		Total ...	900

The Oral Examination for each candidate shall last 20 minutes.

FINAL.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Pharmaceutical Chemistry (Written) ...	100
Second day ...	10—1	Pharmaceutics (Written) ...	100
Third day ...	10—1 2—5	Pharmaceutical Chemistry (Practical (2 days of 6 hours each).	200
Fourth day ...	10—1 2—3		
Fifth day ...	10—12 2-4	Pharmaceutics (Practical) ...	100
Sixth day ...	10—12 2—4	Practical Pharmacognosy (Practical) ...	100
Dates and hours will be notified later ...		Pharmaceutical Chemistry (Oral)	50
		Pharmaceutics (Oral) ...	25
		Practical Pharmacognosy (Oral).	25
		Total ...	700

The Oral Examination for each candidate shall last 20 minutes.

B.E. DEGREE EXAMINATIONS.

First B.E. Examination.

Days.	Hours.	Subjects	Marks.
		PART I—(WRITTEN).	
First day ...	10—1	1. Mathematics I ...	100
Second day ...	10—1	2. Physics ...	100
Third day ...	10—1	3. Chemistry ...	100
Fourth day ...	10—1	4. Applied Mechanics I ...	100
Fifth day ...	10—1	5. Civil Engineering I ...	100
Sixth day ...	10—1	6. Geometrical Drawing ...	100
		Total ...	600
		PART II—(PRACTICAL).	
The dates and hours of Practical Examinations will be notified later.	3 hours each.	Physics ...	100
		Chemistry ...	100
		Workshops ...	100
		Total ...	300
		Grand Total ...	900

Second B.E. Examination.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN).	
Seventh day ...	10—1	7. Mathematics II ...	100
Eighth day ...	10—1	8 Electrical Engineering ...	100
Ninth day ...	10—1	9. Mechanical Engineering ...	100
Tenth day ...	10—1	10. Machine Drawing & Design.	100
Eleventh day ...	10—1	11. Applied Mechanics II ...	100
Twelfth day ...	10—1	12. Civil Engineering II ...	100
Thirteenth day.	10—1	13. Surveying *or* 13. (*a*) General Textile Technology ...	100
Fourteenth day.	10—1	14. Building Drawing ...	100
		Total ...	800
		PART II—(PRACTICAL).	
The dates and hours of Practical Examinations will be notified later.	3 hours.	Strength of Materials ...	100
	*6 hours.	Surveying *or*	
	3 hours.	Textile Technology ...	100
	3 hours.	Electrical Engineering Laboratory ...	100
	3 hours.	Workshops ...	100
		Total ...	400
		Grand Total ...	1,200

* 4 hours for Field Work and 2 hours for Calculation and Plotting.

Third B. E. Examination.

CIVIL AND HIGHWAY BRANCHES.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN)	
First day ...	10—1	1. Mathematics III ...	100
Second day ...	10—1	2. Strength of Materials and Theory of Structures I ...	100
Third day ...	10—1	3. Hydraulics I ...	100
Fourth day ...	10—1	4. Structural Engineering I ...	100
Fifth day ...	10—1	5. Railway and Highway Engineering ...	100
Sixth day ...	10—1	6. Geology ...	100
		Total ...	600
		PART II—(PRACTICAL).	
The dates and hours of Practical Examinations will be notified later.	3 hours.	Strength of Materials ...	50
	3 hours.	Hydraulics ...	50
	*6 hours.	Surveying ...	100
	3 hours.	Geology ...	50
	3 hours	Workshops ...	50
		Total ...	300
		Grand Total ...	900

* 4 hours for Field Work and 2 hours for Calculation and Plotting.

MECHANICAL BRANCH.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN).	
First day ...	10—1	1. Mathematics III ...	100
Second day ...	10—1	2. Strength of Materials and Theory of Structures I ...	100
Third day ...	10—1	3. Hydraulics I ...	100
Fourth day ...	10—1	4. Structural Engineering I ...	
		or	
		4. (*a*) Auto-Engineering ...	100
Fifth day ...	10—1	16. Electrical Technology I ...	100
Sixth day ...	10—1	15. Heat Engines I ...	100
		Total ...	600
		PART II—(PRACTICAL).	
The dates and hours of Practical Examinations will be notified later.	3 hours each.	Strength of Materials ...	50
		Hydraulics ...	50
		Electrical Engineering ...	50
		Mechanical Engineering ...	100
		Workshops ...	100
		Total ...	350
		Grand Total ...	950

ELECTRICAL BRANCH.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN).	
First day ...	10—1	1. Mathematics III ...	100
Second day ...	10—1	2. Strength of Materials and Theory of Structures I ...	100
Third day ...	10—1	3. Hydraulics I ...	100
Fourth day ...	10—1	25. Heat Engines I ...	100
Fifth day ...	10—1	26. Theory and Calculation of Electrical Apparatus I ...	100
Sixth day ...	10—1	27. Design and Drawing I ...	100
		Total ...	600
		PART II—(PRACTICAL).	
The dates and hours of Practical Examinations will be notified later.	3 hours each.	Strength of Materials ...	50
		Hydraulics ...	50
		Electrical Engineering ...	100
		Mechanical Engineering ...	50
		Workshops ...	50
		Total ...	300
		Grand Total ...	900

TELE-COMMUNICATION BRANCH.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN).	
First day ...	10–1	1. Mathematics III ...	100
Second day ...	10–1	2. Strength of Materials and Theory of Structures I	100
Third day ...	10–1	35. Engineering Electronics I	100
Fourth day ...	10–1	25. Heat Engines I (as for Electrical Branch) ...	100
Fifth day ...	10–1	16. Electrical Technology I (as for Mechanical Branch)	100
Sixth day ...	10–1	27. Design and Drawing I (as for Electrical Branch)...	100
		Total ...	600
		PART II—(PRACTICAL)	
The dates and hours of Practical Examinations will be notified later.	3 hours each.	Strength of Materials ...	50
		Electrical Engineering ...	50
		Radio Engineering ...	100
		Mechanical Engineering ...	50
		Workshops ...	50
		Total ...	300
		Grand Total ...	900

AERONAUTICAL BRANCH

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN)	
First day ...	**10—1**	1. Mathematics III ...	100
Second day ...	**10—1**	2. Strength of Materials and Theory of Structures I ...	100
Third day ...	**10—1**	3. Hydraulics I ...	100
Fourth day ...	**10—1**	50. Applied Mechanics III and Simple Theory of Flight ...	100
Fifth day ...	**10—1**	51. Airplane Structures ...	100
Sixth day ...	**10—1**	52. Aircraft Engines and control systems ...	100
		Total ...	600
		PART II—(PRACTICAL)	
The dates and hours of Practical Examinations will be notified later.	**3 hours each**	**Strength of Materials ...**	**50**
		Hydraulics ...	**50**
		Construction of Airplane parts ...	**50**
		Instruments—testing and calibration ...	**100**
		Workshops ...	**50**
		Total ...	**300**
		Grand Total ...	**900**

AUTOMOTIVE BRANCH.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN)	
First day ...	10—1	1. Mathematics III ...	100
Second day ...	10—1	2. Strength of Materials and Theory of Structures ..	100
Third day ...	10—1	3. Hydraulics I ...	100
Fourth day ...	10—1	15. Heat Engines I ...	100
Fifth day ...	10—1	61. Automotive Engines I ...	100
Sixth day ...	10—1	62. Automotive Engineering Design Practice ...	100
		Total ...	600
		PART II—(PRACTICAL)	
The dates and hours of Practical Examinations will be notified later.	3 hours each	Strength of Materials ...	50
		Hydraulics ...	50
		Mechanical Engineering ...	50
		Automotive Engineering ...	100
		Workshops ...	100
		Total ...	350
		Grand Total ...	950

TEXTILE BRANCH.

Days.	Hours	Subjects.	Marks.
		PART I—(WRITTEN)	
First day ...	10—1	71. Textile Technology II ...	100
Second day ...	10—1	72. Preparation and Spinning I ...	100
Third day ...	10—1	73. Preparation and Weaving I ...	100
Fourth day ...	10—1	74. Fabric Structure and Designing I ...	100
Fifth day ...	10—1	75. Industrial Organization and Economics ...	100
Sixth day ...	10—1	76. Textile Chemistry (General).	100
		Total ...	600
		PART II—(PRACTICAL).	
The dates and hours of Practical Examinations will be notified later.	3 hours each	Textile Technology ...	100
		Spinning ...	50
		Weaving ...	50
		Textile Chemistry ...	50
		Total ...	250
		Grand Total ...	850

Final B.E. Degree Examination.

CIVIL BRANCH.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN).	
Seventh day ...	10—1	7. Strength of Materials and Theory of Structures II	100
Eighth day ...	10—1	8. Structural Engineering II	100
Ninth day ...	10—1	9. Hydraulics and Hydraulic Machinery II (Civil)	100
Tenth day ...	10—1	10. Design and Drawing I ...	100
Eleventh day ...	10—1	11. Surveying ...	100
Twelfth day ...	10—1	12. Irrigation, Docks and Harbours	100
Thirteenth day.	10—1	13. Sanitary Engineering ...	100
Fourteenth day.	10—1	14. Design and Drawing II ...	100
		Total ...	800
		PART II (PRACTICAL)	
The dates and hours of Practical Examination will be notified later.	3 hours	Strength of Materials ...	100
	3 hours	Hydraulics ...	100
	*6 hours	Surveying ...	100
		Design and Drawing (*viva voce*).	100
		Total ...	400
		Grand Total ...	1,200

* 4 hours for Field Work, and
2 hours for Calculation and Plotting.

MECHANICAL BRANCH.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN)	
Seventh day ...	10—1	17. Heat Engines II ...	100
Eighth day ...	10—1	18. Electrical Technology II.	100
Ninth day ...	10—1	19. Theory of Machines ...	100
Tenth day ...	10—1	20. Hydraulics and Hydraulic Machinery II (Mechanical and Electrical Engineering)	
		or	
		20. (*a*) Aero Engineering ...	100
Eleventh day ...	10—1	21. Fuels, Gas Plant and Boilers.	100
Twelfth day ...	10—1	22. Workshop Practice and Machine Tools.	100
Thirteenth day.	10—1	23. Design and Drawing ...	100
Fourteenth day.	10—1	24. Engineering Economics ...	100
		Total ...	800
		PART II—(PRACTICAL)	
The dates and hours of Practical Examinations will be notified later.	4 Hours	Mechanical Engineering ...	100
	3 Hours	Electrical Engineering ...	50
	3 Hours	Hydraulics ...	50
	8 Hours	Workshops ...	100
		Design and Drawing (*viva voce*).	100
		Total ...	400
		Grand Total ...	1,200

ELECTRICAL BRANCH

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN)	
Seventh day ...	10—1	28. Heat Engines II ...	100
Eighth day ...	10—1	29. Electrical Theory and Measurements ...	100
Ninth day ...	10—1	30 Theory and Calculation of Electrical Apparatus II ...	100
Tenth day ...	10—1	20. Hydraulics and Hydraulic Machinery II (Mechanical and Electrical) ...	100
Eleventh day ...	10—1	31. Generation aud Utilisation ...	100
Twelfth day ...	10—1	32. Transmission and Distribution.	100
Thirteenth day.	10—1	33. Design, Estimate and Drawing of Electrical Supply Systems.	100
Fourteenth day.	10—1	34. Design and Drawing II ...	100
		Total ...	800
		PART II—(PRACTICAL)	
The dates and hours of Practical Examinations will be notified later.	4 hours	Electrical Engineering ...	150
	3 hours	Mechanical Engineering ...	50
	3 hours	Hydraulics ...	50
	4 hours	Workshops ...	50
		Total ...	300
		Grand Total ...	1,100

TELE-COMMUNICATION BRANCH

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN)	
Seventh day ...	10—1	36. Engineering Electronics II ...	100
Eighth day ...	10—1	18. Electrical Technology II (as for Mechanical Branch)	100
Ninth day ...	10—1	37. High Frequency Measurements ...	100
Tenth day ...	10—1	38. Transmission Circuits ...	100
Eleventh day ...	10—1	39. Broadcasting (Reception) I ...	100
Twelfth day ...	10—1	40. Broadcasting (Transmission) II ...	100
Thirteenth day.	10—1	41. Wire Communication I (Telegraphy) ...	100
Fourteenth day.	10—1	42. Wire Communication II (Telephony) ...	100
		Total ...	800
		PART II—(PRACTICAL)	
The dates and hours of Practical Examinations will be notified later.	3 Hours	Electrical Engineering ...	50
	4 Hours	Workshops ...	50
	4 Hours	Radio Engineering ...	150
	3 Hours	Telegraphy and Telephony Laboratory ...	50
		Design and Drawing (*viva voce*).	100
		Total ...	400
		Grand Total ...	1,200

HIGHWAY BRANCH.

Days.	Hours	Subjects.	Marks.
		PART I—(WRITTEN).	
Seventh day ...	10—1	7. Strengh of Meterials and Theory of Structures II.	100
Eighth day ...	10—1	43. Bridge Engineering ...	100
Ninth day ...	10—1	44. Bridge Design and Drawing.	100
Tenth day ...	10—1	45. Geology and Chemistry of Road Materials ...	100
Eleventh day ...	10—1	46. Surveying ...	100
Twelfth day ...	10—1	47. Highway Engineering I ...	100
Thirteenth day...	10—1	48. Highway Engineering II ...	100
Fourteenth day.	10—1	49. Highway Design and Drawing	100
		Total ...	800
		PART II—(PRACTICAL).	
The dates and hours of Practical Examinations will be notified later.	3 hours	Strength of Materials ...	50
	3 hours	Highway Engineering ...	100
	*6 hours	Surveying ...	100
	3 hours	Design and Drawing (*viva voce*).	100
	3 hours	Geology and Chemistry ...	50
		Total ...	400
		Grand Total ...	1,200

* 4 Hours for Field Work, and
2 Hours for Calculation and Plotting.

AERONAUTICAL BRANCH.

Days.	Hours.	Subjects.	Marks
		PART I—(WRITTEN).	
Seventh day ...	10—1	53. Fluid Mechanics ...	100
Eighth day ...	10—1	54. Technical Aerodynamics ...	100
Ninth day ...	10—1	55. Air Navigation ...	100
Tenth day ...	10—1	56. Meteorology ...	100
Eleventh day ...	10—1	57. Airplane Design ...	100
Twelfth day ...	10—1	58. Aircraft Stress Analysis ...	100
Thirteenth day.	10—1	59. Design Practice ...	100
Fourteenth day.	10—1	60. Production Planning ...	100
		Total ...	800
		PART II—(PRACTICAL).	
		Aircraft drafting and design (*viva voce*) ...	100
The dates and hours of Practical Examinations will be notified later.	3 hours	Testing of Airplane Structures ...	100
	3 hours	Model Testing and Performance Reduction ...	100
	3 hours	Workshops ...	100
		Total ...	400
		Grand Total ...	1,200

AUTOMOTIVE BRANCH.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN)	
Seventh day ...	10—1	63. Automotive Engines II ...	100
Eighth day ...	10—1	64. Chassis and its Components.	100
Ninth day ...	10—1	19. Theory of Machines ...	100
Tenth day ...	10—1	65 Metallurgy and Materials of Construction, and Specifications.	100
Eleventh day ...	10—1	66. Fuels, Gas Plant and Heat Transmission.	100
Twelfth day ...	10—1	22. Workshop Practice and Machine Tools.	100
Thirteenth day.	10—1	67. Chassis Design Practice ...	100
Fourteenth day.	10—1	68. Engineering Economics and Motor Vehicles Trade Laws and Acts.	100
Fifteenth day.	10—1	69. Workshop Practice II ...	100
Sixteenth day.	10—2	70. Design and Drawing ...	150
		Total ...	1,050
		PART II—(PRACTICAL).	
The dates and hours of Practical Examinations will be notified later.	3 Hours	Automotive Engineering ...	200
	8 Hours	Workshops (Automotive) ...	200
	8 Hours	Workshops (General) ...	100
		Design and Drawing (*viva voce*)	100
		Total ...	600
		Grand Total ...	1,650

TEXTILE BRANCH.

Days.	Hours.	Subjects.	Marks.
		PART I—(WRITTEN)	
Seventh day ...	10—1	77. Preparation and Spinning II	100
Eighth day ...	10—1	78. Preparation and Weaving II	100
Ninth day ...	10—1	79. Fabric Structure and Designing II	100
Tenth day ...	10—1	80. Cloth Analysis and Costing of Yarn and Cloth	100
Eleventh day ...	10—1	81. Textile Engineering ...	100
Twelfth day ...	10—1	82. Mill Planning and Organization	100
Thirteenth day.	10—1	83. Economics of Cotton Industry and Trade	100
		Total ...	700
		PART II—(PRACTICAL)	
The dates and hours of Practical Examinations will be notified later.	3 Hours each	Spinning ...	100
		Weaving ...	100
		Fabric Structure ...	50
		Cloth Analysis ...	50
		Total ...	300
		Grand Total ...	1,000

B.T. Degree Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Theory of Education A.B. ...	100
Second day ...	10-12-30	General Methods C. ...	75
	2—4—30	School Organisation and Hygiene D.	75
Third day ...	10-12-30	Methods of Teaching E. Optional subject I	75
	2—4—30	Methods of Teaching E. Optional subject II	75
		Total ...	400

M.Ed. Degree Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Educational Psychology ...	100
Second day ...	10—1	Educational Organization and Administration	100
Third day ...	10—1	History of Education ...	100
Fourth day ...	10—1	Current Problems in Indian Education	100
		Thesis ...	...
		Total ...	400

B.Sc. (Ag.) Degree Examination.

First Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	7—10	Agriculture (Written) ...	60
Second day ...	7—10	Botany do. ...	60
Third day ...	7—10	Chemistry do. ...	60
Fourth day ...	7—10	Zoology do. ...	60
Dates and hours of Practical Examinations will be notified later.		Agriculture (Practical and Oral)...	40
		Botany do. ...	40
		Chemistry do. ...	40
		Zoology do. ...	40
		Total ...	400

Second Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	7—10	Agriculture I—Plant Husbandry (Written).	100
Second day ...	7—10	Agriculture II—Plant Husbandry and Horticulture (Written).	100
Third day ...	7—10	Agricultural Engineering do.	60
Fourth day ...	7—10	Agricultural Zoology do.	60
Fifth day ...	7—10	Animal Hygiene do.	60
Dates and hours of Practical Examinations will be notified later.		Agriculture— (1) Plant Husbandry (Practical and Oral) ...	60
		(2) Horticulture (Practical)	40
		Agricultural Engineering do. ..	40
		Agricultural Zoology do. ...	40
		Animal Hygiene do. ...	40
		Total ...	600

Final Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	7—10	Agriculture I—Agricultural Economics. (Written).	100
Second day ...	7—10	Agriculture II—Farm Management and Animal Husbandry. (Written).	100
Third day ...	7—10	Agricultural Botany I—(Ecology and Crop Botany.) (Written).	100
Fourth day ...	7—10	Agricultural Botany II—Genetics and Plant Breeding, and Cryptogams and Mycology. (Written).	100
Fifth day ...	7—10	Agricultural Chemistry I do.	100
Sixth day ...	7—10	Do. II do.	100
Dates and hours of Practical Examinations will be notified later.		Agriculture—Economics and Farm Management (Practical and Oral).	100
		Agriculture—Animal Husbandry (Practical and Oral).	100
		Agricultural Botany I do.	50
		Do. II do.	50
		Agricultural Chemistry I do.	50
		Do. II do.	50
		Total ...	1,000

B. V. Sc. Degree Examinations.

Preliminary Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Biology (Written) ...	100
Second day. ...	10—1	Chemistry (Written) ...	100
Dates and hours of Practical and Oral Examinations will be notified later.		Biology (Practical) ...	50
		Do. (Oral) ...	50
		Chemistry (Practical) ...	50
		Do. (Oral) ...	50
		Animal Husbandry, Part I (Handling and Shoeing) (Practical) ...	50
		Do. (Oral) ...	50
		Total ...	500

Intermediate—Part I Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Anatomy including Histology and Embryology (Written) ...	100
Second day ...	10—1	Physiology including Experimental Physiology and Biochemistry (Written) ...	100
Third day ...	10—1	Animal Husbandry, Part II (Hygiene) (Written) ...	100
Fourth day ...	10—1	Parasitology (Writen) ...	100
Dates and hours of Practical and Oral Examinations will be notified later.		Anatomy, etc. (Practical) ...	50
		Do. (Oral) ...	50
		Physiology, etc. (Practical) ...	50
		Do. (Oral) ...	50
		Animal Husbandry, Part II (Hygiene) (Practical) ...	50
		Do. (Oral) ...	50
		Parasitology (Practical) ...	50
		Do. (Oral) ...	50
		Total ...	800

Intermediate—Part II Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Pathology and Bacteriology including Immunology (Written).	100
Second day ...	10—1	Pharmacology including Materia Medica and Pharmacy (Written).	100
Third day ...	10—1	Animal Husbandry, Part III (Nutrition) (Written) ...	100
Fourth day ...	10—1	Animal Husbandry, Part III (Dairy Science) (Written) ...	100
Dates and hours of Practical and Oral Examinations will be notified later.		Pathology, etc. (Practical) ...	50
		Do. (Oral) ...	50
		Pharmacology, etc. (Practical) ...	50
		Do. (Oral) ...	50
		Animal Husbandry, Part III (Nutrition) (Practical) ...	50
		Do. (Oral) ...	50
		Animal Husbandry, Part III (Dairy Science) (Practical) ...	50
		Do. (Oral) ...	50
		Total ...	800

Final Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Medicine including Therapeutics and Toxicology (Written) ...	100
Second day ...	10—1	Surgery including Soundness, Obstetrics and Veterinary Jurisprudence (Written) ...	100
Third day ...	10—1	Animal Husbandry, Part IV (Genetics and Breeding) (Written) ...	100
Fourth day ...	10—1	Meat Inspection (Written) ...	100
Dates and hours of Practical and Oral Examinations will be notified later.		Medicine, etc. (Practical) ...	50
		Do. (Oral) ...	50
		Surgery, etc. (Practical) ...	50
		Do. (Oral) ...	50
		Animal Husbandry, Part IV (Genetics and Breeding) (Practical) ...	50
		Do. (Oral) ...	50
		Meat Inspection (Practical) ...	50
		Do. (Oral) ...	50
		Total ...	800

B. Sc. (Tech.) Degree Examination.

(a) Chemical Engineering.

Days.	Hours.	Subjects.	Marks.
		PART I.	
		GROUP A.	
First day ...	10—12	*(1) German ...	50
Second day ...	10— 1	*(2) Practical Mathematics ...	50
Third day ...	10— 1	*(3) Applied Physical Chemistry I..	100
Fourth day ...	10— 1	(4-A) Industrial Geology ..	100
		GROUP B	
Fifth day ...	10— 1	*(5) General Engineering I (A) & (B)	100
Sixth day ...	10— 1	*(6) General Engineering II (A) & (B)	100
Seventh day ...	10— 1	*(7) General Chemical Engineering.	100
Eighth day ...	10— 1	*(8) Drawing I ...	100
		GROUP C.	
		PRACTICAL TESTS:	
The dates and hours of Practical Exminations will be announced later.	6 Hours	(i) Industrial Chemical Analysis ...	80
		Class Records ...	20
	3 Hours	(ii) Electrical Engineering Laboratory ...	50
	3 Hours	Mechanical Engineering Laboratory ...	50
	3 Hours	Workshop ...	50
		Engineering Records ...	50
		Total ...	1,000

*Common papers.

Days.	Hours.	Subjects.	Marks.
		PART II	
		GROUP A.	
First day ...	10— 1	*(9) General Chemical Technology.	100
Second day ...	10— 1	*(10) Industrial Organization and Economics ...	100
Third day ...	10— 1	(11) Chemical Engineering I ...	100
Fourth day ...	10— 1	(12) Chemical Engineering II ...	100
		GROUP B.	
Fifth day ...	10— 1	(13) Chemical Engineering III ...	100
Sixth day ...	10— 1	(14) Chemical Engineering IV ...	100
Seventh day...	10— 1	(15) Drawing II ...	100
		(16) Design of full Chemical Plant (Dissertation) ...	100
		GROUP C.	
		PRACTICAL TESTS:	
The dates and hours of the Practical and *viva voce* Examinations will be announced later.	6 Hours each.	Chemical Engineering I ..	100
		Chemical Engineering II ...	100
		Chemical Engineering III ...	100
		General Chemical Technology ...	100
		Viva voce Examination ...	100
		Class Records:	
		Chemical Engineering Record 50	
		Chemical Technology Record 25	100
		Drawing II (Class Work) 25	
		Total ...	1,400

*Common papers

(c) Textile Technology.

Days.	Hours.	Subjects.		Marks.
		PART I.		
		GROUP B.		
First day ...	10–1	(4-C) General Textile Chemistry I.		100
Second day ...	10—1	(17) Preparation and Spinning I ...		100
Third day ...	10—1	(18) Preparation and Weaving I ...		100
Fourth day ...	10—1	(19) Fabric Structure and Designing I.		100
Fifth day ...	10—1	(20) General Textile Technology ...		100
		GROUP A.		
Sixth day ...	10-11-30	*(5) General Engineering I (A) Engineering Materials and Construction of Works.		50
Seventh day.	10—1	*(6) General Engineering II (A) and (B).		100
Eighth day ...	10—1	*(8) Drawing I ...		100
Ninth day ...	10—1	(2-A) Theory of Machines and Textile Mechanics.		100
		GROUP C.		
		PRACTICAL TESTS :		
The dates and hours of Practical Examinations will be announced later.	3 Hours each.	(i) Preparation and Spinning I.		100
		(ii) Preparation and Weaving I.		100
		(iii) Textile Testing ...		100
		(iv) (a) Electrical Engineering Laboratory ...	50	
		(b) Mechanical Engineering Laboratory ...	50	200
		(c) Workshop ...	50	
		Engineering Records ...	50	
		Total ...		1,350

* Common papers.

Days.	Hours	Subjects.	arks.
		PART II	
		GROUP A.	
First day ...	10—1	* (10) Industrial Organization and Economics ...	100
Second day ...	10—1	(21) Preparation and Spinning II ...	100
Third day ...	10—1	(22) Preparation and Weaving II ...	100
Fourth day ...	10—1	(23) Fabric Structure and Designing II ...	100
Fifth day ...	10—1	(24) General Textile Chemistry II ...	100
Sixth day ...	10—1	(25) Cloth Analysis and Costing of Yarn and Cloth ...	100
Seventh day.	10—1	(26) Textile Engineering ...	100
Eighth day ...	10—1	(26-A) Drawing II ...	100
Ninth day ...	10—1	(27) Cotton Industry and Trade ...	100
		GROUP B.	
		PRACTICAL TESTS:	
The dates and hours of Practical Examinations will be announced later.	3 Hours each	(1) Preparation and Weaving II ...	100
		(2) Preparation and Spinning II ...	100
		(3) General Textile Chemistry ...	100
		(4) Textile Designing ...	100
		(5) Cloth Analysis and Testing ...	100
		(6) Class Records ...	100
		Total ...	1,500

* Common papers.

(d) Leather Technology.

Days.	Hours.	Subjects.	Marks.
		PART I.	
		GROUP A.	
First day ...	10—12	*(1) German ...	50
Second day ...	10—1	*(2) Practical Mathematics ...	50
Third day ...	10—1	*(3) Applied Physical Chemistry I ...	100
Fourth day ...	10—1	(4-B) Industrial Organic Chemistry.	100
Fifth day ...	10—1	*(6) General Engineering II ...	100
Sixth day ...	10—1	*(7) General Chemical Engineering.	100
Seventh day.	10—1	*(8) Drawing I ...	100
		GROUP B.	
Eighth day ...	10—1	(28) Introductory Leather Manufacture ...	100
Ninth day ...	10—1	(29) Chemistry of Leather Manufacture ...	100
		GROUP C	
		PRACTICAL TESTS:	
The dates and hours of Practical Examinations will be announced later	6 hours.	(i) Industrial Chemical Analysis ...	175
	3 hours.	Laboratory Records ...	25
		(ii) Leather Training Practical ...	100
		Total ...	1,100

*Common papers.

Days.	Hours.	Subjects.	Marks.
		PART II	
		GROUP A.	
First day ...	10—1	*(9) General Chemical Technology...	100
Second day ...	10—1	*(10) Industrial Organization and Economics ...	100
Third day ...	10—1	(30) Chemistry of Leather Manufacture II ...	100
Fourth day ...	10—1	(31) Chemistry of Leather Manufacture III ...	100
		GROUP B.	
Fifth day ...	10—1	(32) Organization and Economics of Leather Manufacture ...	100
Sixth day ...	10—1	(33) Processes of Leather Manufacture I ...	100
Seventh day...	10—1	(34) Processes of Leather Manufacture II ...	100
Eighth day ...	10—1	(35) Analytical Chemistry of Leather Manufacture ...	100
		GROUP C.	
		PRACTICAL TESTS:	
The days and hours of Practical Examinations will be announced later.	3 days	Analyses of Materials and Products of Leather Manufacture ...	300
	1 day	Dyeing and Finishing of Leather ...	100
	1 day	Leather Tanning ...	100
		Laboratory Records ...	50
		Tannery Records ...	50
		Total ...	1,400

*Common papers.

B. Com. Degree Examination.

Days.	Hours.	Subjects.	Marks.
		PART I	
First day ...	10—1	* English—Prose ...	100
Second day ...	10—1	* English—Composition ...	100
		Total ...	200
		PART II—*A Second Language.*	
Third day ...	10—1	Composition and Translation ...	100
		PART III	
Fourth day ...	10—1	@Economics—General ...	100
Fifth day ...	10—1	Banking, Theory and Practice ...	100
Sixth day ...	10—1	Mercantile Law ...	100
Seventh day...	10—1	Business Organization and Commercial Geography ...	100
Eighth day ...	10—1	Accountancy ...	100
Ninth day ...	10—1	Auditing ...	100
Tenth day ...	10—1	Precis Writing and Business Correspondence ...	100
Eleventh day..	10—1	Optional subject ...	100
		Total ...	800

* The papers in English shall be the same as for Part I—English of the B. Sc. Degree Examination.

@ The question paper shall be the same as for B.A. Part III, Groups (iv-a), (iv-b), (iv-c) and (iv-d)—Economics—General.

B.Com. (Hons.) Degree Examination.

Part I—Preliminary Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	*English Composition ...	100
Second day ...	10—1	Precis Writing and Business Correspondence ...	100
		Total ...	200

* In common with B.A. (Hons.) Preliminary Examination.

Part II—Final Examination.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Rural Economics ...	175
Second day ...	10—1	History and Principles of Co-operation and Co-operative Laws.	175
Third day ...	10—1	Mercantile Law ...	175
Fourth day ...	10—1	*General Economics ...	175
Fifth day ...	10—1	Banking ...	175
Sixth day ...	10—1	Accountancy ...	175
Seventh day.	10—1	Auditing—General and Co-operative.	175
Eighth day ...	10—1	Business Organization ...	175
		Total ...	1,400

* In common with B.A. (Hons.) Branches III, V and XIII.

THE DIPLOMAS IN ECONOMICS AND POLITICS AND PUBLIC ADMINISTRATION

Diploma in Economics.

Days.	Hours.	Subjects.	Marks.
First day ..	10—1	Economcis ...	100
Second day..	10—1	Statistical Methods ...	100
Third day ...	10—1	Recent Economic History and Economic Geography ...	100
Fourth day..	10—1	Rural Economics ...	100
Fifth day ...	10—1	Social Economics including Elements of Social Institutions ...	100
Sixth day ...	10—1	Special Subject ...	100
		Thesis (to be submitted by the candidates before 1st July) ...	150
		Total ...	750

Diploma in Politics and Public Administration.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Politics ...	100
Second day..	10—1	Public Administration ...	100
Third day ...	10—1	History of Administration, etc. ...	100
Fourth day..	10—1	Economics ...	100
Fifth day ..	10—1	Public Finance ...	100
Sixth day ...	10—1	Optional Subject—Law ...	100
Seventh day	10—1	Optional Subject—Commerce ...	100
		Total ...	700

Diploma in Co-operation.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Economics-Agricultural Organization, and Industrial and Commercial Organization ...	100
Second day..	10—1	Co-operation I-History and Principles.	100
Third day ...	10—1	Co-operation II—Law and Practice ...	100
Fourth day..	10—1	Banking—Law and Practice ...	100
Fifth day ...	10—1	Accountancy ...	100
Sixth day ...	10—1	Auditing ...	100
Day and hour of Practical Examination will be notified later.	(3 hours)	Practical Examination ...	100
		Total ...	700

Diploma in Statistics.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Mathematics ...	100
Second day..	10—1	Economics ...	100
Third day ...	10—1	Statistical Methods ...	100
Fourth day ..	10—1	Applied Statistics ...	100
Fifth day ...	10—1	Special Subject I ...	100
Sixth day ...	10—1	Special Subject II ...	100
Day and hour of Practical Examination will be notified later.		Practical Examination ...	75
		Practical Note-book ...	25
		Total ...	700

Certificates and Diplomas in French and German.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Text-books and Grammar (French) ...	100
Second day	10—12	Translation (French) ...	100
	2—4	Translation (German) ...	100
Third day ...	10—1	Text-books and Grammar (German).	100
		Total in each language ...	200

Diploma in Librarianship.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Bibliography, Book Selection and Reference Work ...	100
Second day ...	10—1	Organization ...	100
Third day ...	10—1	Administration ...	100
Fourth day ...	10—1	Classification ...	100
Fifth day ...	10—1	Cataloguing ...	100
Sixth day ...	10—1	Practical—Classification ...	100
Seventh day...	10—1	Practical—Cataloguing ...	100
		Total ...	700

Diploma in Geography.

Days.	Hours.	Subjects.	Marks.
		PART I	
First day ...	10—1	Physical Basis of Geography ...	100
Second day..	10—1	Practical Geography ...	100
		Field Work Records (to be submitted before the 1st April in the year of the examination) *or* Dissertation (Thesis to be submitted by the candidates by the 15th May in each year after the examination) ...	100
		Practical Note-Book ...	100
		PART II.	
Third day ...	10—1	Regional Geography of the World ...	100
Fourth day..	10—1	Regional Geography of India ...	100
Fifth day ...	10—1	Regional Geography of the Selected Continent ...	100
Sixth day ...	10—1	Optional subject ...	100
		Total ...	800

Diploma in Indian Music.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	Indian Music—Theory—Written Examination—Paper I ...	100
Second day..	10—1	Do. do.—Paper II ...	100
Dates and hours will be notified later.		Practical Examination I ...	150
		Do. II ...	150
		Total ...	500

Certificates in Anthropology.

(i) Social and Cultural Anthropology.

Days.	Hours.	Subjects.	Marks.
First day ...	10—12	1. Social and Cultural Anthropology Paper I ...	75
Second day ...	10—12	2. Social and Cultural Anthropolgy Paper II ...	75
		Total ..	150

(ii) Physical Anthropology.

Third day ...	10—1	1. Physical Anthropology and Ethnology ...	100
Fourth day ... The date of the Practical Examination will be notified later.	3 hours	2. Practical Work ...	50
		Total ...	150

Diploma in Anthropology.

Days.	Hours.	Subjects.	Marks.
First day ...	10—12	1. *Social and Cultural Anthropology*—Paper I ...	75
Second day ...	10—12	Paper II ...	75
		Total ...	150
Third day ...	10—1	2. Physical Anthropology and Ethnology ...	100
Fourth day ...	3 hours	Practical ...	50
		Total ...	150
Fifth day ...	10—1	3. Prehistoric Archaeology ...	100
Sixth day ...	1 hour	Practical ...	20
			120
		Grand Total ...	420

Diploma in Journalism.

Days.	Hours.	Subjects.	Marks.	
First day ...	10—1	A. 1. Journalism ...	100	
Second day ...	10—12	2. History of the Freedom of the Press and Ethics in Journalism ...	50	
Third day ...	10—12	3. Composition, Precis Writing and Proof Reading ...	50	200
Fourth day ...	10—12	B. 4. Legal Studies ...	50	
Fifth day ...	10—12	5. Political Science and Modern Constitutions, etc. ...	50	100
Sixth day ...	10—12	C. 6. Social and Economic Structure of To-day ...	50	
Seventh day ...	10—12	7. History of the Modern World ...	50	
Eighth day ...	10—12	8. Everyday Science ...	50	150
Ninth day ...	10—11-40	D. 9. Shorthand ...	50	
	15 Minutes	10. Typewriting ...	50	100
		Total ...		550

Diploma in Physical Education.

Days.	Hours.	Subjects.	Marks.
First day ...	10—1	1. Organization and Administration of Physical Education...	100
Second day ...	10—1	2. Anatomy, Physiology and Hygiene ...	100
Third day ...	10—1	3. Health Education and First Aid and Safety Education ...	100
Fourth day ...	10—1	4. Rules of Games, Coaching, etc	100
Fifth day ...	10—1	5. Principles and Philosophy of Physical Education and History of Physical Education...	100
		Total ...	500

ANNEXURE III

CHAPTER XXXVII.

Fees.

1. Candidates for Examinations, Diplomas and Degrees shall pay the following fees :—

Statute. **Examination Fees.**

(a) *Examination fees :*

	Rs.
Matriculation Examination ...	15
English Part Only ...	5
Intermediate Examination—	
Whole Examination ...	30
Part I only ...	12
Part II only ...	10
Part III only ...	20
For one subject under Part III ...	8
For each science subject under Part III in which a practical test has been prescribed, an additional fee of ...	3
B. A. Degree Examination—	
First appearance—	
Whole Examination or any Part or Parts...	50
Subsequent appearance—	
Whole Examination ...	50
Part I ...	22
Part II ...	12
Part III ...	28
B. A. (Honours) Degree Examination—	
Preliminary ...	15
Final ...	70
M. A. Degree Examination ...	70
B. Sc. Degree Examination—	
Part I ...	15
Part II ...	45
B. Sc. (Honours) Degree Examination —	
Part I ...	15
Part II—Any Branch ...	75
(For all candidates, including post-graduate course students under Regulations 18 and 19 of Chapter L.)	
Science Subjects (Physics, Chemistry or any Natural Science Subject)—	
Subsidiary Subject or Subjects ...	30
Main Subject ...	45

	Rs.
M. Sc. by Examination ...	150
B. Sc. (Ag.) Degree Examination—	
First Examination ...	30
Second Examination ...	40
Final Examination ...	50
Subsequent appearance —	
For each subject for any Examination ...	15
B.V.Sc. Degree Examination—	
Preliminary Examination ...	25
Intermediate Examination—Part I ...	30
Intermediate Examination—Part II ...	30
Final Examination ...	50
Subsequent appearance (in subjects)—	
For each subject in the Preliminary or Intermediate Examination ...	15
For each subject in the Final Examination.	20
B.Sc. (Tech.) Degree Examination—	
Whole Examination ...	125
Part I only ...	50
Part II only ...	75
Subsequent appearance (in subjects)	
For each subject under any Part ...	10
B.T. Degree Examination ...	25
B.T. Degree Examination—Practical Test for deferred candidates ...	10
B.T. Degree Examination—Additional Subject (including Practical test) ...	15
M.Ed. Degree Examination ...	50
Subsequent appearance—	
Written papers only ...	35
Thesis only ...	20
B.L. Degree Examination—	
F.L. Examination ...	50
For each Division ...	25
B.L. Degree Examination ...	70
For each Division ...	25
M.L. Degree Examination ...	150
LL.D. Degree ...	250
Pre-Registration Examination (for the M.B. & B.S. Degree Course)—	
First appearance—either whole or in Part...	30
Subsequent appearance—Each subject ...	15

	Rs.
M.B. & B.S. Degree Examination—	
First M.B. & B.S. Examination—	
Whole Examination ...	55
Part I only ...	20
Part II only ...	40
Separate subjects after first appearance—	
Part I—Organic Chemistry ...	20
Part II—Anatomy or Physiology ...	25
Second M.B. & B.S. Examination—	
Whole Examination ...	60
Part I only ...	25
Part II only ...	45
Separate subjects after first appearance—	
Part I—Pharmacology ...	25
Part II—Hygiene and Preventive Medicine or General Pathology with Bacteriology ...	25
Final M.B. & B.S. Degree Examination—	
First appearance—	
Whole Examination ...	85
Part I only—Forensic Medicine and Ophthalmology ...	35
Part II only ...	60
Separate subjects after first appearance—	
Part I—One subject (Forensic Medicine or Ophthalmology) ...	20
Part II—One subject (Medicine, Surgery, or Obstetrics and Gynaecology)	25
M.D. or M.S. Degree Examination ...	200
Diploma in Gynaecology and Obstetrics ...	75
Diploma in Venereology ...	75
Diploma in Dermatology ...	75
Diploma in Ophthalmology ...	75
Diploma in Oto-Rhino-Laryngology—	
Whole Examination ...	75
Do. Part I ...	30
Do. Part II ...	45
Diploma in Radiology-Whole Examination...	75
Do. Part I ...	30
Do. Part II ...	45
Diploma in Orthopaedics ...	75
Diploma in Tuberculosis ...	75

	Rs.
B.S.Sc. Degree Examination—	
Part I ...	60
Part II ...	100
B.Sc. (Pharmacy) Examination—	
Preliminary Examination—	
First appearance ...	35
Subsequent appearance—Each subject ...	10
Final Examination—	
First appearance ...	50
Subsequent appearance—Each subject ...	20
B.Sc. (Nursing) Examinations—	
Intermediate Examination in Science in Nursing ...	35
Subsequent appearance—	
Part I only ...	12
Part II only ...	15
Part III only ...	20
B.Sc. (Nursing) Degree Examination—	
Whole Examination ...	75
Subsequent appearance—	
Part I only ...	10
Part II only ...	30
Part III only ...	40
B.E. Degree Examination—	
First B.E. Examination ...	30
Second B.E. Examination ...	40
Third B.E. Examination ...	45
Final B.E. Degree Examination ...	60
Subsequent appearance in any subject in any examination ...	10
B. Com. Degree Examination—	
Part I ...	15
Part II ...	7
Part III ...	38
B. Com. (Honours) Degree Examination—	
Part I ...	15
Part II ...	70
Oriental Titles Examination—	
Entrance Test to the following Oriental Titles—	
Vidvan, Adib-i-Fazil, Malpan and Soppar and Titles in Arabic and Persian ...	10

	Rs.
Entrance Test for Intermediate— Group D ...	15
Oriental Titles—	
Preliminary Examination ...	25
Final Examination ...	30
B.O.L. (Pass) Degree Examination—	
Part I ...	15
Part II ...	35
B.O.L. (Honours) Degree Examination—	
Preliminary ...	15
Final ...	70
Sangitha Siromani Title—	
Preliminary—	
Whole Examination ...	25
Parts I and III for candidates under Regulation 9 of Chapter LVII ...	25
Part II only ...	10
Final—Whole Examination ...	35
Bachelor of Music (B. Mus.) Degree Examination—	
Whole Examination ...	50
Part I only ...	15
Part II only ...	25
Part III only ...	30
Examination for the Diploma in Economics ...	50
Examination for the Diploma in Politics and Public Administration ...	50
Examination for the Diploma in Statistics ...	50
Subsequent appearance in a Special Subject ...	15
Examination for the Diploma in Modern European Languages (French or German) ...	20
Examination for the Diploma in Librarianship—First appearance—	
Whole Examination or any Division or Divisions ...	30
Subsequent appearance—	
Whole Examination ...	30
Any Division ...	10
Examination for the Diploma in Geography ...	50
Subsequent appearance — Dissertation only ...	20

		Rs.
Examination for the Diploma in Indian Music	...	30
Subsequent appearance—Practical Test in a subject or subjects (each subject)	...	15
Examination for the Diploma in Anthropology	...	50
Examination for the Diploma in Journalism	...	50
Subsequent appearance—Shorthand or Typewriting	...	6
Examination for the Certificate in Anthropology	...	15
Examination for the Certificate in Modern European Languages (French or German)	...	15
Examination for the Diploma in Physical Education	...	50
Research Degrees :		
Degree of Master of Letters (M. Litt.)	...	150
Degree of Master of Science (M.Sc.)	...	150
Degree of Doctor of Philosophy (Ph. D.)	...	200
Degree of Doctor of Letters (D. Litt.)	...	250
Degree of Doctor of Science (D.Sc.)	...	250
(*b*) *Degree or Diploma Fee*—		
Diploma Fee (for taking Degree at a Convocation in person)	...	5
Degree *in absentia* Fee (including Diploma Fee)	...	15
M.A. Degree Fee	...	25
Diploma Fee (for Certificates and Diplomas given at a Special Meeting of the Senate) other than for Degrees taken at a Convocation	...	3
Diploma *in absentia* Fee (for Certificates and Diplomas given at a Special Meeting of the Senate) other than for Degrees taken at a Convocation	...	5

provided that the above fees shall not be levied in the case of Honorary Degrees.

Statute.
Fees from Research Students and Fellows permitted to work in the Depts. of the University.

2. Research Students and Fellows (stipendiary and non-stipendiary) permitted to study in the Departments of the University or under any Teacher of the University shall pay the following fees :—

Persons working in Arts Departments—either Rs 30 per annum or Rs. 10 per term (thrice in a year)

Persons working in Science Departments—either Rs. 45 per annum or Rs 15 per term (thrice in a year).

Statute.
Recognition or Affiliation Fee.

3. A College applying for recognition or affiliation shall pay a fee at the rate of Rs 150/- for each member of the Inspection Commission appointed ; and a College applying for approval in courses in Oriental Titles shall pay a fee at the rate of Rs. 50/- for each member of the Commission appointed.

Statute.
Registration of Graduates Fee.

4. Graduates applying for Registration in the List of Registered Graduates shall pay a fee of Rs. 5.

5. *Other Fees*—

The following are the other fees prescribed :—

Ordinance.
Fees for Matriculation, Diploma courses, etc.

	Rs.
I. (1) For registration as a Matriculate ...	5
(2) For registration as a candidate for the M. Litt., M. Sc. or Ph. D. Degree ...	50
(3 (*a*) For registration as a student for any of theDiploma Courses in Medicine or Surgery (inclusive of attending lectures under (*b*) and (*c*) *infra*) : (*b*) Prescribed fee payable to the University in connexion with the Course of Post-Graduate Lectures in Medicine or Surgery arranged by the Council of Post-Graduate Medical Education: ... and/or (*c*) Prescribed fee payable to the University in connexion with the Refresher Courses arranged by the Council of Post-Graduate Medical Education.	100

	Rs.
(3-A) For attending a part course specified in clause (3) above comprising one specific subject or branch in Medicine ...	50
(4) For applying for admission to the B. Sc. (Tech.) Degree Course ...	5
(5) For undergoing the B. Sc. (Tech.) Degree Course ...	200 per year or Rs. 75 per term
(6) For undergoing the Diploma Course in Economics (two years course—Rs 100)	50 per year
(7) For undergoing the Diploma Course in Economics (one year course) ...	100
(8) For undergoing the course of lectures in one or more subjects for the Diploma Course in Economics (for each subject)...	25
(9) For undergoing the Diploma Course in Politics and Public Administration (two years course—Rs. 100) ...	50 per year
(10) For undergoing the course of lectures in one or more subjects for the Diploma Course in Politics and Public Administration (for each subject) ...	25
(11) For undergoing the Diploma Course in Statistics (two years course—Rs. 100) ...	50 per year
(12) For undergoing the course of lectures in one or more subjects for the Diploma Course in Statistics (for each subject) ...	25
(13) For undergoing the Certificate Course in French or German (one year course) ...	60

provided, however, it shall be competent for the Syndicate to admit certain classes of applicants under the conditions enumerated in the proviso to Regulation 45 of Chapter LXXVII, at a concession rate of Rs. 45/-per candidate.

		Rs.
(14) For undergoing the Diploma Course in French or German	...	60 per year
provided, however, it shall be competent for the Syndicate to admit certain classes of applicants under the conditions enumerated in the proviso to Regulation 45 of Chapter LXXVII, at a concession rate of Rs. 45/-per candidate.		
(15) For undergoing the Diploma Course in Librarianship (one year course)	...	60
(16) For undergoing the Diploma Course in Geography (one year course)	...	100
(17) For Field Work by students of the Diploma Course in Geography	...	25
(18) For undergoing the lectures in one or more subjects for the Diploma Course in Geography (for each subject)	...	25
(19) For undergoing the Diploma Course in Indian Music (two years course—Rs. 75)		37½ per year
(20) For undergoing the lectures in one or more subjects for the Diploma Course in Indian Music (for each subject)	...	25
(21) For undergoing the Certificate Course in Anthropology (One year course)	...	50
(22) For undergoing the Diploma Course in Anthropology (two years course—Rs. 100)	...	50 per year
Field work	...	25
(23) For undergoing the Diploma Course in Journalism (one year course)	...	100

Ordinance.
Other Fees for getting Marks, certificates, etc.

II. (1) (*a*) (i) For considering application for exemption from the production of attendance certificates (Applications from students studying in Constituent or Affiliated or Oriental Colleges or University Departments).. 10

Rs.

Provided, however, it shall be competent for the Syndicate to waive the payment of the above fee for exemption in cases where the candidates could not produce the prescribed certificates of attendance owing to the reduction of the College to a lower grade (voluntary or otherwise), or the closing down of the College, or the College not having been granted the necessary recognition or affiliation in time.

(ii) Application for exemption from candidates after private study (non-collegiate) for Oriental Titles Examination, Preliminary/Final, for Entrance Test to Oriental Titles and for Entrance Test for Intermediate—Group D (*vide* Ordinances 3 and 4 of Chapter XXXV, Regulation 9 (h) and (j) (iv) of Chapter XL and Regulation 1 (*a*) (4) of Chapter XLII) ... 15

(iii) Application for exemption from candidates after private study (non-collegiate) for all Examinations other than Oriental Titles and Entrance Test to Oriental Titles and for Intermediate--Group D, *viz.*, Matriculation, Intermediate, B.A., B.Sc. (Honours), M.A., B.O.L. (Pass and Hons.) or other Examinations ... 25

(b) For scrutiny of applications under Ordinance 1 (b), (c) and (d) of Chapter XLI—Matriculation Examination ... 10

(2) For considering application for recognition of an examination of another University or examination conducted by other Bodies outside the jurisdiction of the University ... 5

(3) For considering application for combination of attendances earned by a candidate in two colleges ... 5

(4) For scrutiny of Secondary School-Leaving Certificates of candidates who sat for the examination prior to 1926, and of

	Rs.
those who sat for the examination within the Madras Presidency and outside the University area ...	5*
(5) For scrutiny of Madras European High School-Leaving Certificates of candidates who sat for the examination prior to 1927, and of those who sat for the examination outside the University area after 1927 ...	5
(6) For scrutiny of Bangalore European High School Certificates of candidates who sat for the examination prior to 1933 ...	5
(7) For considering application for recognition of change of name ...	10
(8) For endorsing in the University records in regard to the change in the date of birth, whether due to clerical error or otherwise ...	10
(9) For obtaining a duplicate Diploma or Certificate ...	10
(10) For obtaining a Provisional Certificate ...	5
**(11) For application for Intermediate Certificate received by the Registrar after the prescribed date ...	3
(12) For application for Certificates and Diplomas (other than Intermediate) received by the Registrar one year after the examination ...	3
(13) For application for Certificates and Diplomas received by the Registrar five years after the examination ...	10
(14) For obtaining a Migration Certificate ...	5
(15) *(a)* For issue of a certified extract from Convocation Reports ...	5
(b) For issue of a certified extract from the Eligible List, (S S. L. C. or E.S.L.C. or E.H.S. Examination) ...	5
(16) For issue of a certified extract from the Registers or Records of the University	

*Also for scrutiny of Certificates with Shorthand or Typewriting as optional, from the examination of 1932.

**Dates will be notified in the *Fort St. George Gazette* when publishing the results.

(other than from the Convocation Reports and Eligible Lists) ... 2

(17) (*a*) For furnishing to a candidate a statement of marks obtained by him at the Intermediate Examination on each occasion (March 1945 *et seq*) 1

(*Note*: —This fee of Re. 1/- should be paid by all candidates appearing for the Intermediate Examination along with their examination fees.)

(*b*) For furnishing to a candidate a statement of marks obtained by him at the B. A. Degree Examination, for each Part ... 2

(*c*) For furnishing to a candidate a statement of marks obtained by him at any examination other than the Intermediate and the B. A. Degree Examinations ... 2

(*d*) For furnishing to a candidate detailed marks obtained by him at each examination —for details of each subject comprising a minimum (additional fee) ... 1

(*e*) For furnishing to a candidate a statement of marks obtained by him at the Intermediate Examination for each appearance (whether for a Part or Parts or for the Whole Examination) at examinations prior to March 1945 or for furnishing duplicate statement of marks for each appearance ... 2

(18) For checking the addition of the marks in each paper of a candidate for any University Examination (for each paper) ... 10

(19) (*a*) For supplying to Principals of Colleges marks of all the successful candidates at the Matriculation and Intermediate Examinations (for each examination of the year) ... 20

(*b*) For supplying to Principals of Colleges marks of all the candidates (passed and failed) from a particular College for the B.A., B.Sc., B.A. (Hons.), B.Sc. (Hons.), F.L., B.L., M.B. & B. S., B.T., F.E., B.E., B.Sc. Ag., or any other examination *for fifty candidates, or less*	Annas 8 per candidate subject to a maximum fee of Rs. 10 for an examination, for fifty candidates or less.
(*c*) For supplying to Principals of Colleges detailed marks in each subject comprising a minimum (for each candidate) ...	1

ANNEXURE IV

CHAPTER XXXVIII.

Dates for Payment of Examination Fees and Submission of Certificates, Dates of Commencement of Examinations, and Dates of Publication of Results of Examinations.

Ordinance.
Dates of Examinations, dates of submission of applications and attendance certificates, and dates of publication of results.

The latest dates on which fees for examinations shall be payable, and applications for admission thereto and certificates to be produced by candidates are to be submitted to the Registrar in the forms prescribed, the dates on which examinations shallbegin, and the dates on which the results of the examinations shall be publishetd at the University Buildings shall be :—

Examinations.	Last date for receipt of applications, together with the receipt of payment of fees, in the Registrar's Office.	Last date for submitting certificates.
Arts and Science— Matriculation ...	December 15 ...	March 9 ...
Intermediate ...	January 10 ... or July 5 ...	March 9 ... or August 15 ...
*B.A. Part I ...	January 10 ... or July 5 ...	March 9 ... or August 15 ...
Part II ...	Do. ...	Do. ...
Part III ...	Do. ...	Do. ...
B.A. (Hons.) Preliminary	January 10 or July 5 ...	March 9 ... or August 15 ...
B.A. (Hons.) Final ...	December 15 ...	March 9 ...
M.A.	Do. ...	Do. ...
*B.Sc. Part I ...	January 10 ... or July 5 ...	March 9 ... or August 15 ...
Part II ...	Do. ...	Do. ...
B.Sc. (Hons.)— Part I	January 10 ... or July 5 ...	March 9 ... or August 15 ...
Part II (Main)	December 15 ...	March 9 ...
*Part II (Subsidiary)	January 10 ... or July 5 ...	March 9 ... or August 15 ...
M.Sc. or M. Litt. ...	January 31 ... or August 31 ...	... ...
Ph.D.	January 31 ... or August 31 ...	... ...

**Note*:—Particulars regarding the dates of commencement of examin- and Part II—Subsidiary Subjects (only) of the B.Sc. (Honours) Degree published.

Date of commencement of examinations.	Last date of publication of results.
March 20 ...	3rd Monday in May
March 20 ... or September 1 ...	3rd Monday in May or October 5
March 20 ... or September 1 ...	4th Monday in May or October 5
Immediately after the examination in Part I	Do.
Immediately after the examination in Part II	Do.
March 20 ... or September 1 ...	4th Monday in May or October 5
March 20 ...	2nd Monday in May
Do. ...	Do.
March 20 ... or September 1 ...	4th Monday in May or October 5
Immediately after the examination in Part I	Do.
March 20 ... or September 1 ...	4th Monday in May or October 5
March 20 ...	3rd Monday in May
Same days as for B.A. and B. Sc. Subsidiary Subjects.	4th Monday in May or October 5
...	...
...	...
...	...
...	...

ations in Parts II and III of the B. A. Degree, Part II of the B. Sc. Degree, will be notified in the *Fort St. George Gazette* when the time-tables **are**

Examinations.	Last date for receipt of applications, together with the receipt of payment of fees, in the Registrar's Office.	Last date for submitting certificates.
D. Litt. or D. Sc. ...	January 31 ... or August 31 ...	... ...
Law— F.L. and B.L. ...	January 15 ... or July 15 ...	April 1 ... or September 10 ...
M.L.	January 15 ...	...
LL.D.	January 31 ... or August 31 ...	... ...
Medicine— Pre-Registration Examination	October 8 ... or Januray 15 ...	December 1 ... or March 20 ...
M.B. & B.S.— First and Second Examinations	Do. ...	November 20 ... or March 20
Final Examination ...	Do.	Do.
M.D. or M.S ...	January 15 ...	January 15 ...
Diploma in Gynaecology and Obstetrics	January 15 ... or July 15 ...	January 15 ... or July 15 ...
Diploma in Venereology	Do. ...	Do. ...
Diploma in Dermatology	Do. ...	Do. ...
Diploma in Ophthalmology ...	Do. ...	Do. ...
Diploma in Oto-Rhino-Laryngology ...	Do. ...	Do. ...
Diploma in Radiology	Do. ...	Do. ...
Diploma in Orthopaedics	Do. ...	Do. ...
Diploma in Tuberculosis	November 15 or June 1 ...	January 5 ... or July 5 ...

Date of commencement of examinations.	Last date of publication of results.
...	...
...	...
April 15 or September 25	2nd Monday in June or 2nd Monday in November
July 15	1st Monday in September
...	...
...	...
December 10 or April 1	January 5 or 3rd Monday in April
December 1 or April 1	December 20 or April 20
Do.	December 20 or May 1
April 1	May 1
April 1 or October 15	May 1 or November 15
Do.	Do.
Do.	Do.
Do.	Do.
Do.	Do.
Do.	Do.
Do.	Do.
January 15 or July 15	February 15 or 2nd Monday in August

Examinations.	Last date for receipt of applications, together with the receipt of payment of fees, in the Registrar's Office.	Last date for submitting certificates.
B.S.Sc.— Part I	December 1 ... or March 1 ...	January 5 ... or April 5 ...
Part II ...	June 1 ... or October 15 ...	July 5 or November 10 ...
B.Sc. (Pharmacy)—		
Preliminary ...	October 8 ... or January 15 ...	December 1 ... or March 20 ...
Final ...	January 15 ... or October 8 ...	March 20 ... or December 1 ...
B.Sc. (Nursing)—		
Intermediate Examination in Science in Nursing	January 15 ... or ... July 15 ...	March 20 ... or October 1 ...
B.Sc. Degree (Nursing)— Final Examination in Nursing ...	January 15 ... or ... July 15 ...	March 20 ... or October 1 ...
Engineering—		
F. E. and B. E. (*Old Regulations*) ...	January 15 ...	March 9 ...
F. E. (*Revised Regulations*)—		
Part I ...	January 15 ...	March 9 ...
Part II ...	Do. ...	Do. ...
B.E. Degree (*Revised Regulations*)—		...
Part I ...	January 15 ...	March 9 ...
Part II ...	Do. ...	Do. ...

Date of commencement of examinations.	Last date of publication results.
January 15 ... or April 15 ...	1st Monday in February or 1st Monday in May
July 15 ... or November 20 ...	2nd Monday in August or December 20
December 10 ... or April 1 ...	January 5 or May 1
April 1 ... or December 10 ...	May 1 or January 5
April 1 ... or October 15 ...	May 1 or November 15
April 1 ... or October 15 ...	May 1 or November 15
March 20 ...	1st Monday in May
March 20 ...	1st Monday in May
Immediately after Part I ...	Do.
March 20 ...	1st Monday in May
Immediately after Part I.	Do.

Examinations.	Last date for receipt of applications, together with the receipt of payment of fees, in the Registrar's Office.	Last date for submitting certificates.
Engineering *(New Regulations)*—		
First B.E. ...	January 15 ...	March 9 ...
Second B. E. ...	Do. ...	Do. ...
Third B. E. ...	Do. ...	Do. ...
Final B. E. Degree ...	Do.	Do.
Teaching—		
B. T.	January 15 ... or July 5 ...	March 19 ... or August 15 ...
*Practical Test (for deferred candidates) ...	...	...
M. Ed. ...	January 15 ...	March 19 ...
Agriculture—		
B. Sc. (Ag.)— ...		
First Examination...	January 15 ...	March 19 ...
Second Examination	Do. ...	Do. ...
Final Examination...	Do. ...	Do. ...
Veterinary Science—		
B.V. Sc. *(Old Regulations)*—		
Preliminary Examination.	March 1 ... or September 1 ...	March 15 ... or September 15 ...
Intermediate Examination—Part I ...	Do. ...	Do. ...
Intermediate Examination—Part II ...	Do. ...	Do. ...

*(*Note:*—The first test for the students will be conducted by the

Date of commencement of examinations.	Last date of publication of results.
March 20 ...	1st Monday in May
Immediately after First B.E. Examination	Do.
March 20	Do.
Immediately after Third B. E. Examination	Do.
April 1 ... or September 1 ...	4th Monday in May or October 5
First week of March ...	...
April 1	4th Monday in May
April 1 ...	3rd Monday in May
Do. ...	Do.
April 8 ...	Do.
April 1 ... or October 1 ...	2nd Monday in May or 1st Monday in November
Do. ...	Do.
Do. ...	Do.

leges in February *vide* Rgulation 4 (b) of Chapter LXX.)

Examinations.	Last date for receipt of applications, together with the receipt of payment of fees, in the Registrar's Office.	Last date for submitting certificates.
Final Examination ...	March 27 ... or September 15 ...	April 8 ... or October 1 ...
B.V.Sc. (*Revised Regulations.*)—		
Preliminary Examination ...	March 1 or September 1	March 15 ... or September 15 ...
Intermediate Examination—Part I	Do.	Do. ...
Intermediate Examination—Part II	Do.	Do. ...
Final Examination ...	May 15 or November 15	June 1 ... or December 1 ...
B.Sc. (**Tech.**)—		
Part I ...	January 15 ...	March 19 ...
Part II ...	Do. ...	Do. ...
B. Com.—		
Part I	January 10 ... or July 5 ...	March 9 ... or August 15 ...
Part II ...	Do. ...	Do. ...
Part III ...	Do. ...	Do. ...
Oriental Titles—		
Entrance Test to Vidvan course.	November 15 ...	...
Preliminary ...	Do. ...	March 9 ...
Final ...	Do. ...	Do. ...

Date of commencement of examinations.	Last date of publication of results.
3rd Monday in April ... or October 15 ...	4th Monday in May or 2nd Monday in November
April 1 ... or October 1 ...	2nd Monday in May ... or 1st Monday in November ...
Do.	Do. ...
Do.	Do. ...
June 15 or December 15	4th Monday in July or 4th Monday in January ...
April 1	3rd Monday in May
Immediately after Part I ...	Do.
March 20 ... or ... September 1 ...	4th Monday in May or October 5
Immediately after the examination in Part I.	Do.
Immediately after the examination in Part II.	Do.
Same day as Part II—Second Language—Intermediate Examination in March	4th Monday in May
March 27 ...	Do.
Immediately after the Preliminary Examination.	Do.

Examinations.	Last date for receipt of applications, together with the receipt of payment of fees, in the Registrar's Office.	Last date for submitting certificates.
B.O.L.—		
Part I	November 15 ... or July 5	March 9 ... or August 15 ...
Part II ...	November 15 ...	March 9 ...
Part III ...	Do.	Do.
Oriental Titles— (*Revised*)		
*Entrance Test ...	November 15 ...	...
English Papers (Matriculation Examination) for Entrance Test for Intermediate—Group D and Sangita Siromani candidates.	Do.	...
†Preliminary	November 15 ... or July 5 ...	March 9 ... or August 15 ...
†Final ...	Do.	Do.
B. O. L. (*Revised*)—		
Part I	November 15 ... or July 5 ...	March 9 ... or August 15 ...
†Part II	November 15 ... or July 5 ...	March 9 ... or August 15 ...
B. O. L (Honours)—		
Part I	November 15 ... or July 5 ...	March 9 ... or August 15 ...
Part II ...	November 15 ...	March 9 ...

*Also common for Entrance Test for Intermediate—Group D

†Examinations in Oriental Titles (Intermediate—Group D) and in which colleges are affiliated and candidates are appearing therefrom.

**The paper on *General Indian History* should be taken along

‡The paper on *The History of India* should be taken along

Date of commencement of examinations.	Last date of publication of results.
March 20 ... or September 1 ...	4th Monday in May or October 5
Same day as O. T. Final Examination.	4th Monday in May
Immedidately after the O. T. Final Examination.	Do.
Same day as Part II—Second Language—Intermediate Examination in March.	4th Monday in May
March 20 ...	4th Monday in May
March 27 ... or September 4 ...	4th Monday in May or October 5
Do. ...	Do.
March 20 ... or September 1 ...	4th Monday in May or October 5
**March 27 ... or September 4 ...	4th Monday in May or October 5
March 20 ... or September 1 ...	4th Monday in May or October 5
‡March 20 ...	4th Monday in May

candidates.
B.O.L. (Pass) Part II will be held in September only in such languages

with the B.A. Group (iv-a) candidates on the same day.
with the B.A. (Hons.) Branch III candidates on the same day.

Examinations.	Last date for receipt of applications, together with the receipt of payment of fees, in the Registrar's Office.	Last date for submitting certificates.
M. O. L.	January 31 ... or August 31 ...	... ...
Sangita Siromani—		
Preliminary—		
Part I ...	November 15 ...	March 9 ...
Part II ...	Do ...	Do. ...
Part III ...	Do ...	Do. ...
Final—		
Part I ...	Do. ...	Do. ...
Part II ...	Do. ...	Do. ...
†Diploma in Economics...	January 15 ...	March 19 ...
Diploma in Politics and Public Administration	January 15 ...	April 15 ...
Diploma in Statistics ...	March 15 ...	April 15 ...
Certificate in French ...	January 15 ...	April 10 ...
Diploma in French ...	Do ...	Do. ...
Certificate in German ...	Do ...	Do. ...
Diploma in German ...	Do ...	Do. ...
Diploma in Librarianship.	January 15 ...	April 1 ...
*Diploma in Geography.	January 15 ...	April 1 ...
Diploma in Indian Music.	January 15 ...	April 1 ...
Certificate in Anthropology	January 15 ...	April 10 ...
Diploma in Anthropology	Do. ...	Do. ...
Diploma in Journalism	November 15 ...	January 5 ...

† Last date for submission of Thesis, July 1.
* Last date for submission of Dissertation, May 15.

Date of commencement of examinations.	Last date of publication of results.
...	...
...	...
March 20 ...	4th Monday in May
Same day as for Intermediate Part II	Do.
Immediately after the Examination in Part II	Do.
March 20 ...	4th Monday in May
Immediately after the Examination in Part I	Do.
July 10 ...	3rd Monday in August
July 10 ...	3rd Monday in August
July 10 ...	3rd Monday in August
April 25 ...	2nd Monday in June
Do.	Do.
April 26 ...	Do.
Do.	Do.
April 20 ...	4th Monday in May
April 10 ...	June 15
April 10 ...	4th Monday in May
April 25 ...	1st Monday in June
April 27 ...	Do.
January 15 ...	February 15

Provided that applications for admission to examinations received within a period of five days after the dates specified above will be accepted on payment of a fee of Rupee one per candidate.

Provided further that if any of the dates under columns 2 to 5 *supra* happen to be holidays, the next working day shall be considered as the due date for the purpose enumerated under each of the columns.

Provided also that it shall be competent for the Registrar to publish the results on any day succeeding the dates mentioned only when it has been found necessary to postpone publication beyond the dates prescribed, after giving notice in the newspapers.

Provided also that :—

(1) In the case of the March-April Examinations Thursday, Friday and Saturday before Easter Day and Easter Monday and Easter Tuesday shall be *dies non*.

(2) The Syndicate shall so fix the dates of the several examinations as to avoid, as far as may be practicable, the setting of duplicate sets of question papers in the same subject.

(3) The dates of commencement of all examinations and time-tables in detail shall be published in the *Fort St. George Gazette* by the Syndicate in the preceding February or August.